Appendix B

Quality Assurance Project Plan, Quanta Resources Corporation Superfund Site, Operable Unit 1, Edgewater, New Jersey

Prepared for

Honeywell

August 2012

CH2MHILL®

537417

Contents

Acronyms and Abbreviations .... **vii**

1 Introduction **1-1**

2 Sampling Procedures **2-1**
- 2.1 Sampling Design 2-1
- 2.2 Sampling Method Requirements 2-1
- 2.3 Field Quality Control Samples 2-1
  - 2.3.1 Field Duplicate Samples 2-1
  - 2.3.2 Equipment Blanks 2-1
  - 2.3.3 Trip Blanks 2-1
  - 2.3.4 Matrix Spike/Matrix Spike Duplicate 2-2
- 2.4 Sample Documentation and Tracking 2-2

3 Sample Handling and Custody **3-1**
- 3.1 Containers and Preservatives 3-1
- 3.2 Chain of Custody 3-1
  - 3.2.1 Laboratory Responsibilities 3-2
- 3.3 Sample Packaging and Transport 3-3
  - 3.3.1 Sample Container Preparation 3-3
  - 3.3.2 Shipping Cooler Preparation 3-3
  - 3.3.3 Placing Samples in the Cooler 3-4
  - 3.3.4 Closing the Cooler 3-4
  - 3.3.5 Transport 3-4

4 Data Quality Objectives and Quality Assurance Program **4-1**
- 4.1 Precision, Accuracy, Representativeness, Completeness, and Comparability 4-1
  - 4.1.1 Precision 4-1
  - 4.1.2 Accuracy 4-1
  - 4.1.3 Representativeness 4-1
  - 4.1.4 Completeness 4-2
  - 4.1.5 Comparability 4-2
- 4.2 Method Detection Limits, Reporting Limits, and Instrument Calibration Requirements 4-2
  - 4.2.1 Method Detection Limits 4-2
  - 4.2.2 Reporting Limits 4-3
  - 4.2.3 Instrument Calibration 4-3
- 4.3 Elements of Quality Control 4-6
  - 4.3.1 Quality Control Analyses/Parameters Originated by the Laboratory 4-6
  - 4.3.2 Quality Control Analyses Originated by the Field Team 4-8
- 4.4 Additional Quality Control Requirements 4-8
  - 4.4.1 Holding Time 4-8
  - 4.4.2 Confirmation 4-8
  - 4.4.3 Cleanup Procedures to Minimize Matrix Effects 4-8
  - 4.4.4 Sample Dilution 4-9
  - 4.4.5 Standard Materials and Other Supplies and Consumables 4-9

4.4.6 Manual Integration 4-9
4.4.7 Laboratory Quality Assurance Program 4-9
4.5 EPA Pre-Methods 4-10
4.5.1 Pre-Method 1313 4-10
4.5.2 Pre-Method 1314 4-11
4.5.3 Pre-Method 1315 4-11
4.6 Additional Field Methods 4-12
4.7 Reporting Limits and Analytical Requirements 4-12

5 Calibration Procedures and Frequency 5-1
5.1 Field Calibration Procedures 5-1
5.2 Laboratory Calibration Procedures 5-1

6 Data Reduction, Validation, and Reporting 6-1
6.1 Laboratory Data Management 6-1
6.1.1 Data Deliverables 6-1
6.1.2 Hardcopy and Electronic Deliverables 6-4
6.2 Data Validation and Verification 6-4
6.2.1 Level 2, 3, and 4 Validation Procedures 6-5

7 Performance Evaluations 7-1
7.1 Technical Systems Audits 7-1
7.1.1 Laboratory Audits 7-1
7.1.2 Field Audits 7-1
7.2 Performance Audits 7-1
7.2.1 Performance Evaluations 7-1
7.2.2 External Audits 7-1
7.2.3 Internal Audits 7-1

8 Preventive Maintenance 8-1
8.1 Maintenance Responsibilities 8-1
8.2 Maintenance Schedules 8-1
8.3 Spare Parts 8-2

9 Data Assessment 9-1

10 Corrective Action 10-1

11 Quality Assurance Management 11-1

12 Data Management 12-1
12.1 Archiving 12-1
12.2 Data Flow and Transfer 12-1
12.3 Record Keeping 12-1

13 Project Roles and Organization 13-1

14 References 14-1

Appendices

A Sample Handling
B AESI EDD Regulations

Tables

3-1	Sample Containers, Preservation, and Holding Times	3-4
4-1	Extraction and Digestion Methods	4-12
4-2	Reporting Limit and Control Limit Objectives for Volatiles in Soils and Sediments, SW846 8260B	4-13
4-3	Reporting Limit and Control Limit Objectives for Semi-volatiles in Soils and Sediments, SW846 8270C	4-16
4-4	Reporting Limit and Control Limit Objectives for Total Petroleum Hydrocarbons in Soil and Sediments, SW846 8015B	4-20
4-5	Reporting Limit and Control Limit Objectives for Metals in Soils and Sediments, SW846 6010B/7471A	4-21
4-6	Reporting Limit and Control Limit Objectives for Volatiles in Water, SW846 8260B	4-22
4-7	Reporting Limit and Control Limit Objectives for Semi-volatiles in Water, SW846 8270C	4-25
4-8	Reporting Limit and Control Limit Objectives for Semi-volatiles/PAHs in Water, SW846 8270SIM	4-29
4-9	Reporting Limit and Control Limit Objectives for Total Petroleum Hydrocarbons in Water, SW846 8015B	4-30
4-10	Reporting Limit and Control Limit Objectives for Metals in Water, SW846 6010B/7470A	4-31
4-11	Reporting Limit and Control Limit Objectives for Arsenic Speciation in Water, SW846 6800	4-32
4-12	Reporting Limit and Control Limit Objectives for Total Organic Carbon in Water, EPA 415.1	4-32
4-13	Air Methods and Parameters	4-33
6-1	Flagging Conventions for Organic Methods	6-6
6-2	Flagging Conventions for Inorganic Methods	6-11
6-3	Qualifier Flag Definitions	6-15
13-1	Project Roles and Organization	13-1

Acronyms and Abbreviations

ASTM	American Society for Testing and Materials
CLP	Contract Laboratory Program
COPC	constituents of potential concern
DQO	data quality objective
EB	equipment blank
EPA	U.S. Environmental Protection Agency
FD	field duplicate
ICP	inductively coupled plasma
L/A	liquid-to-surface-area ratio
LCS	laboratory control sample
LSP	liquid-solid partitioning
MDL	method detection limit
MS/MSD	matrix spike and matrix spike duplicate
QA/QC	quality assurance/quality control
QAPP	quality assurance project plan
RPD	relative percent difference
RSD	relative standard deviation
SOP	standard operating procedure
SOW	statement of work
TB	trip blank
VOA	volatile organic analysis
VOC	volatile organic compound
XRF	x-ray fluorescence

SECTION 1

Introduction

This Quality Assurance Project Plan (QAPP) presents the project-specific quality assurance/quality control (QA/QC) requirements for the Quanta Resources Corporation Superfund Site in Edgewater, N.J. This QAPP is an integral part of the Predesign Investigation Work Plan, which governs all sampling and analysis activities currently planned for the site. These plans ensure that data of appropriate quality are collected and meet project-specific requirements. The QAPP is intended for use by CH2M HILL and others who provide services associated with the environmental data collection effort.

The QAPP presents the QA/QC requirements designed to ensure that environmental data collected for the site are of the appropriate quality to achieve the project objectives as defined in the work plan. The QAPP specifies the requirements for laboratory analyses, data handling, data evaluation and assessment performance evaluations, chain-of-custody requirements, corrective actions, preventive maintenance of equipment, and additional information regarding sample handling and storage and field quality control.

The elements included in this QAPP are consistent with those specified in *Requirements for Quality Assurance Project Plans (QA/R5)* (EPA, 2001, reissued 2006). The objectives of the QAPP are to:

- Ensure that data collection and measurement procedures are standardized among all participants;
- Monitor the performance of the various measurement systems being used in the program to maintain statistical control and provide rapid feedback, so that corrective measures, if needed, can be taken before the data quality is compromised;
- Periodically assess the performance of these measurement systems and their components; and
- Verify that reported data are sufficiently complete, comparable, representative, unbiased, and precise, so that they are suitable for their intended use.

This QAPP supplements the work plan(s), field sampling plan(s), project instructions, and any other project-specific documents.

SECTION 2

Sampling Procedures

2.1 Sampling Design

The number and location of samples to be collected from the site and the rationale behind the sampling design are discussed in the site investigation work plan. The sampling design is a function of the medium sampled, information about the sampling site, the type of data to be collected, and how the data are to be used. The specific protocols for sampling, equipment decontamination, handling of investigation-derived wastes, and field quality control are discussed in the work plan.

2.2 Sampling Method Requirements

The work plan outlines sampling methods to be used during this investigation.

2.3 Field Quality Control Samples

Quality control samples will be collected to monitor accuracy, precision, and the presence of field contamination for analytical methods to be performed in the offsite laboratory. The frequency of collection of the quality control samples is outlined below.

2.3.1 Field Duplicate Samples

A field duplicate (FD) is an independent sample collected as close as possible to the original sample—from the same source and under identical conditions—that is used to document sampling and analytical precision. FDs will be collected at a minimum frequency of 10 percent or one per sampling event, whichever is more frequent, for each matrix and for each type of analysis. The sampling procedures described in the work plan will be followed. The sampling locations for FD samples will be recorded in the field logbook.

Duplicate samples will be collected simultaneously or in immediate succession to original samples, using identical recovery techniques, and treated identically during storage, transportation, and analysis.

2.3.2 Equipment Blanks

Equipment rinsate blanks (EBs) are collected to evaluate field sampling and decontamination procedures by pouring deionized water over the decontaminated equipment. EBs will be collected after sampling at the suspected most-affected field location or at the end of each day. Additionally, EBs will be collected for each matrix sampled and will be collected at a rate of 1 in 20 (minimum of one per day). The EBs will be analyzed in the offsite laboratory for the same parameters specified for the corresponding matrix.

2.3.3 Trip Blanks

Trip blanks (TBs) are used to monitor for contamination during sample shipping and handling, and for cross-contamination through volatile organic compound (VOC) migration among the collected samples. They are prepared in the laboratory by pouring American Society for Testing and Materials (ASTM) Type II or deionized water into the sample container. They are then sealed, transported to the field, kept sealed while VOC samples are taken, and transported back to the laboratory in the same cooler as the VOC samples. One TB will be placed in each cooler that contains VOC samples shipped from the field to the laboratory.

2.3.4 Matrix Spike/Matrix Spike Duplicate

A matrix spike and matrix spike duplicate (MS/MSD) are a duplicate pair of samples—collected along with an investigatory sample to which the laboratory adds a spike containing the analytes of concern at known concentrations to assess the effect of the sample matrix on the extraction and analysis method.

For every 20 field samples of each matrix collected from each site, one location will have a sample volume collected in triplicate for each analysis required and designated on the chain-of-custody form as an MS/MSD. MS/MSD samples may involve obtaining an independent pair of samples collected as close as possible to the original (parent) sample, from the same source under identical conditions, or prepared by the laboratory as part of its QA program and subsampled from an investigatory sample.

Independent MS/MSD samples will be collected simultaneously or in immediate succession, using identical recovery techniques as the parent sample, and treated in an identical manner during storage, transportation, and analysis. The sampling locations for the MS/MSD will be documented in the field logbook.

2.4 Sample Documentation and Tracking

Sample containers should be received from the laboratory prelabeled with the preservative. The sample identification nomenclature and date and time of sampling should be entered on the label immediately after collection. The labels must be secured using clear tape to maintain the identification of each sample.

Vital information regarding the collection of each sample will be recorded in a field logbook. A separate logbook will be used for this site. It will be bound with consecutively numbered pages. All entries will be legibly written in black ink and signed and dated by the individual making the entries. Factual and objective language will be used. All entries will be complete and accurate enough to allow reconstruction of each field activity. The types of information to be recorded during collection are specified in the work plan.

SECTION 3

Sample Handling and Custody

3.1 Containers and Preservatives

Laboratories will provide the required sample containers for all environmental and associated QC samples. All containers will be certified free of the analytes of concern for this project. No sample containers will be reused. The contracted laboratory will add preservatives, if required, prior to shipping the sample containers to the field. The laboratory, upon receipt of the samples, will verify the adequacy of preservation and will add additional preservative, if necessary. The containers, minimum sample quantities, required preservatives, and maximum holding times for many parameters are listed in Table 3-1.

3.2 Chain of Custody

Collecting data of known quality begins at the point of sample collection. Legally defensible data are generated by adhering to proven evidentiary procedures. These procedures are outlined in the following sections and must be followed to preserve and ensure the integrity of all samples from the time of collection through analysis. Sample custody records must be maintained both in the field and in the subcontractor laboratory. A sample is considered to be in someone's custody if it is either in his or her physical possession or view, locked up, or kept in a secured and restricted area. Until shipment, sample custody will be the responsibility of the sampling team leader.

Chain-of-custody records document sample collection and shipment to the laboratory. A chain-of-custody form will be completed for each sampling event. The original copy will be provided to the laboratory with the sample shipping cooler, and a copy will be retained in the field documentation files. The chain-of-custody form will identify the contents of each shipment and maintain the custodial integrity of the samples. All chain-of-custody forms will be signed and dated by the responsible sampling team personnel. The "relinquished by" box will be signed by the responsible sampling team personnel, and the date, time, and airbill number will be noted on the chain-of-custody form. The laboratory will return the executed copy of the chain-of-custody with the hardcopy report.

The shipping coolers containing the samples will be sealed with a custody seal any time the coolers are not in an individual's possession or view before shipping. All custody seals will be signed and dated by the responsible sampling team personnel.

At a minimum, the chain-of-custody form must contain the following:

- Site name
- Project Manager, Project Chemist, and Data Manager names, telephone numbers, and fax numbers
- Unique sample identification
- Date and time of sample collection

- Source of sample (including name, location, sample type, and matrix)
- Number of containers
- Designation of MS/MSD
- Preservative used
- Analyses required
- Name of sampler
- Custody transfer signatures and dates and times of sample transfer from the field to transporters and to the laboratories
- Bill of lading or transporter tracking number (if applicable)
- Turnaround time
- Lab name, address, and contact information
- Any special instructions

Erroneous entries on chain-of-custody records will be corrected by drawing a line through the error and entering the corrected information. The person performing the correction will date and initial each change made on the chain-of-custody form.

3.2.1 Laboratory Responsibilities

Once the samples reach the laboratory, they will be checked against information on the chain-of-custody form for anomalies. The condition, temperature, and appropriate preservation of samples will be checked and documented on the chain-of-custody form. Checking an aliquot of the sample using pH paper is an acceptable procedure (precautions must be taken to avoid contamination of the sample). Samples requiring VOC analyses should not undergo preservation verification until the time of analysis. The occurrence of any anomalies in the received samples and their resolution will be documented in laboratory records. All sample information will then be entered into a tracking system and unique analytical sample identifiers will be assigned. A copy of this information will be reviewed by the laboratory for accuracy. Sample holding time tracking begins with the collection of samples and continues until the analysis is complete. *Samples not preserved or analyzed in accordance with the requirements in this QAPP will be resampled and analyzed at no additional cost to CH2M HILL or Honeywell.*

Laboratory analyses will be documented on the chain-of-custody form. Procedures ensuring internal laboratory chain-of-custody will also be implemented and documented by the laboratory. Ideally, sample custody will be maintained using an internal custody system that requires samples to be kept in a secured and restricted area when not in use, and to be checked out and checked back in by the analysts who use the samples. Internal custody records must be maintained by the laboratory as part of the documentation file for each sample. Specific instructions concerning the analysis specified for each sample will be communicated to the analysts. Analytical batches will be created and laboratory quality control samples will be introduced into each batch.

While samples are stored in the laboratory, they will be stored in limited-access, temperature-controlled areas. Refrigerators, coolers, and freezers will be monitored for temperature 7 days a week. Acceptance criterion for the temperatures of the refrigerators and coolers is 4°C ± 2°C. Acceptance criterion for the temperatures of the freezers will be less than 0°C. All of the cold-storage areas will be monitored by thermometers that have been calibrated with a National Institute of Standards and Technology-traceable thermometer. As indicated by the findings of the calibration, correction factors will be applied to each thermometer. Records that include acceptance criteria will be maintained. Samples for VOC determination will be stored separately from other samples, standards, and sample extracts. Samples will be stored after analysis (as defined in the project statement of work or Honeywell Master Services Agreement, whichever is longer) until disposed of in accordance with applicable local, state, and federal regulations. Disposal records will be maintained by the laboratory.

Along with sample receipt documentation, the following information will be documented on sample receipt forms by the sample custodian:

- Date samples received
- CH2M HILL sample identification number
- Laboratory sample identification number
- Analytical tests requested for the sample batch
- Sample matrix
- Number of samples in the batch
- Container description and location in the laboratory
- Verification of sample preservation

Standard operating procedures (SOPs) describing sample control and custody will be maintained by the laboratory.

When samples designated "hold" on the chain-of-custody are released for analysis by CH2M HILL, an official letter must be submitted to the laboratory, and the chain-of-custody should be resubmitted to the Data Manager and Project Chemist with relevant release notification. The laboratory will also submit appropriate documentation to the Project Chemist and Data Manager confirming the samples that will be released for analysis.

3.3 Sample Packaging and Transport

The following sections contain guidelines for sample packaging and transport that may be superseded, amended, or replaced in the work plan or addendum to this QAPP.

3.3.1 Sample Container Preparation

- Labels will be secured to each container with clear tape, if not previously done.

- Container lids will be checked for tightness, and if the container is not full, the outside of the container will be marked with indelible ink at the sample volume level.

- Sample bottles will be double-bagged in heavy-duty plastic. Glass containers will be covered with bubble wrap to prevent breakage.

3.3.2 Shipping Cooler Preparation

- All previous labels used on the sample-shipping cooler will be removed.

- Drain plugs will be sealed with fiberglass tape (outside and inside) to prevent melting ice from leaking.
- A cushioning layer of packing material such as bubble wrap will be placed at the bottom of the cooler (approximately 1 inch thick) to prevent cooler contents from breaking during shipment.
- The cooler will be lined with a large plastic bag (same type used to contain samples).
- All ice will be double-bagged in a Ziploc-type plastic bag.

3.3.3 Placing Samples in the Cooler

- The chain-of-custody form will be placed in a Ziploc-type bag.
- Samples will be placed in an upright position in the cooler.
- Ice will be placed on top of samples and between samples. Ideally, ice will be placed in resealable plastic bags in duplicate to minimize leakage of ice melt into the cooler.
- Void space between samples will be filled with packing material.

3.3.4 Closing the Cooler

- The cooler lid will be taped with strapping tape that encircles the cooler several times.
- Custody seals may also be affixed to the cooler lid to further ensure the integrity of the samples.

3.3.5 Transport

- Sample coolers will be transported to the laboratory (an overnight courier may be used) immediately after sample collection. Intermediate stops will be avoided with the exception of emergencies only, in which case the situation will be noted in the field notebooks.
- The laboratory will be notified that samples are being shipped.

TABLE 3-1
Sample Containers, Preservation, and Holding Times
Quanta, Quality Assurance Project Plan

Analyses	Analytical Method	Sample Matrix[a]	Container[b]	Qty	Preservative[c]	Holding Time [d]
Volatile organic compounds	SW-846 8260B	S	8-oz glass	1	Cool 4°C	14 days
	SW-846 8260B	W	40-mL glass	3	HCl, pH<2, Cool 4 ºC	14 days
Semivolatile organic compounds	SW-846 8270C	S	8-oz glass	1	Cool 4°C	14/40 days
	SW-846 8270C	W	1-L amber glass	2	Cool 4°C	7/40 days
Gasoline range organics	SW-846 8015B-P	S	8-oz glass	1	Cool 4°C	14 days

TABLE 3-1
Sample Containers, Preservation, and Holding Times
Quanta, Quality Assurance Project Plan

Analyses	Analytical Method	Sample Matrix[a]	Container[b]	Qty	Preservative[c]	Holding Time [d]
	SW-846 8015B-P	W	40-mL glass	3	HCl, pH<2, Cool 4ºC	14 days
Diesel range organics	SW-846 8015B-E	S	8-oz glass	1	Cool 4°C	14/40 days
	SW-846 8015B-E	W	1-L amber glass	2	Cool 4°C	7/40 days
Metals	SW-846 6010B	S	8-oz glass	1	Cool 4°C	6 months
	SW-846 6010B	W	500-mL polyethylene	1	HNO_3, pH<2, Cool 4°C	6 months
Mercury	SW-846 7471A	S	8-oz glass	1	Cool 4°C	28 days
	SW-846 7470A	W	500-mL polyethylene	1	HNO_3, pH<2, Cool 4°C	28 days
Particle size distribution	ASTM D-422-63	S	16-oz glass	1	None	NA
pH	SW-846 9045C	S	4-oz glass	1	None	24 hours
Total organic carbon	E415.1	W	250-mL polyethylene	1	H_2SO_4 or HCl, pH<2, Cool 4°C	28 days
Arsenic speciation As(III) & As(V)	IC-ICP-MS	W	125-mL HDPE	1	EDTA, Cool 4°C, keep dark	14 days
Arsenic sequential extraction	Sequential extraction	S	4-oz Poly Jar/ Intact Core is preferred	1	Cool 4°C	7 days
Consolidation	ASTM D2435	S	500-g glass	1	None	NA
Shear strength	ASTM D4767	S	500-g glass	1	None	NA
Unconfined compressive strength	ASTM D2166	S	1 Shelby tube	1	None	NA
Pocket penetrometry	Per instrument manual	S	1 Shelby tube	1	None	NA
Hydraulic conductivity/ permeability	ASTM D5084 Method A	S	1 Shelby tube	1	None	NA
Arsenic soil-water partitioning coefficient (K_d)	ASTM D4646-03 or ASTM C1733-10	S	1-L container	1	None	NA
Pore fluid saturation, bulk density, total porosity, particle density	Dean-Stark, API (1998) Sec. 4.3	S	Shielded macrocore sampler	1	None	NA

TABLE 3-1
Sample Containers, Preservation, and Holding Times
Quanta, Quality Assurance Project Plan

Analyses	Analytical Method	Sample Matrix[a]	Container[b]	Qty	Preservative[c]	Holding Time [d]
Product mobility analysis by water flooding	API (1998)	S	Shielded macrocore sampler	1	None	NA
Mercury in air	Modified EPA Method 30B	A	Sorbent Trap	1	None	NA
Metals in air by ICP	Modified NIOSH 7300	A	Filter	1	None	NA
Hexavalent chromium in air	Modified OSHA Method 215	A	Filter	1	None	24 hrs
PAHs in air	TO-9/Modified NIOSH 5506	A	Filter and polyurethane foam (PUF) / filter	1	None	7 days (TO9)/NA (5506)
PCBs in air	TO-13A (PUF)/NIOSH 5503	A	Filter and polyurethane foam (PUF) in glass cartridge (TO13A)/Florisil tubes (5503)	1	Cool 4°C	7 days (TO13A)/2 months (5503)
VOCs in air	TO-15/Modified NIOSH 1501	A	Summa Canister	1	None	30 days

Notes:
Sample container and volume requirements will be specified by the analytical laboratory performing the tests.
Three times the required volume should be collected for samples designated as MS/MSD samples.
[a]Sample matrix: S = surface soil, subsurface soil, sediment; W = surface water; A = air
[b]All containers will be sealed with Teflon®-lined screw caps.
[c]All samples will be stored promptly at 4°C in an insulated chest.
[d]Holding times are from the time of sample collection.
ºC = Degrees Centigrade
mL = Milliliter
g = Gram
L = Liter
oz = Ounce
EPA = U.S. Environmental Protection Agency
H_2SO_4 = Sulfuric acid
ASTM = American Society for Testing and Materials
NA = Not applicable

SECTION 4

Data Quality Objectives and Quality Assurance Program

The data quality objectives (DQOs) for the project were established based upon EPA (2000) DQA guidance. They are the basis for the design of the data collection plan and, as such, these DQOs specify the type, quality, and quantity of data to be collected, and how the data are to be used to make the appropriate decisions for the project. The DQOs consider a seven-step process; each step derives valuable criteria used to establish the final data collection design. The first five steps of the process identify mostly qualitative criteria, such as what problem has initiated the project and what decision is needed to resolve it. These steps also define the type of data to be collected, where and when the data will be collected, and a decision rule that defines how the decision will be made. The sixth step defines quantitative criteria, expressed as limits on decision errors that can be tolerated by the decision maker. The final step is the development of the data collection design using the criteria developed in the previous six steps. The final output of the process is a data collection design that meets the qualitative and quantitative needs of the project.

4.1 Precision, Accuracy, Representativeness, Completeness, and Comparability

Data quality will be evaluated based on their precision, accuracy, representativeness, completeness, and comparability.

4.1.1 Precision

Precision is a measure of reproducibility of analytical results. It can be defined as the degree of mutual agreement among individual measurements obtained under similar conditions. Total precision is a function of the variability associated with both sampling and analysis. Precision will be evaluated as the relative percent difference (RPD) between field duplicate sample results and laboratory sample duplicates, or between the MS and MSD results. Field duplicates will compose 10 percent of the sampling effort. MS/MSD samples will be field designated at a 5 percent frequency.

4.1.2 Accuracy

Accuracy is the degree of agreement between a measured value and the “true” (or expected) value. It represents an estimate of total error from a single measurement, including either systematic error (bias) or random error that may reflect variability due to imprecision. Accuracy is evaluated in terms of percent recoveries determined from results of MS/MSD and laboratory control sample (LCS) analyses.

4.1.3 Representativeness

Representativeness is the degree to which sample data accurately reflect the characteristics of a population of samples. It is achieved through a well-designed sampling program and by using standardized sampling strategies and techniques, and analytical procedures.

Factors that can affect representativeness include site homogeneity, sample homogeneity at a single point, and available information around which the sampling program is designed. Using multiple methods to measure an analyte can also result in nonrepresentativeness of sample data.

4.1.4 Completeness

Completeness is the amount of valid measurements compared to the total amount generated. It will be determined for each method, matrix, and analyte combination. The completeness goals of each project are optimized to meet the DQOs. The goals for this program are 95 percent.

4.1.5 Comparability

Comparability is the confidence with which one data set can be compared to another. It is achieved by maintaining standard techniques and procedures for collecting and analyzing samples, and reporting the analytical results in standard units. Results of performance evaluation samples and systems audits will provide additional information for assessing comparability of data among participating subcontractor laboratories.

4.2 Method Detection Limits, Reporting Limits, and Instrument Calibration Requirements

The requirements specified in the section are for the analyses that are being performed according to EPA methods other than those established by the Contract Laboratory Program (CLP).

4.2.1 Method Detection Limits

The method detection limit (MDL) is the minimum concentration of a substance that can be measured and from which it can be reported with 99 percent confidence that the analyte concentration is greater than zero. Each participating laboratory will establish the MDL for each method, matrix, and analyte for each instrument that will be used to analyze samples. The MDLs will initially be calculated before analyzing samples and will be recalculated at least once every 12 months.

1. Estimate the MDL using one of the following:
    a. The concentration value that corresponds to an instrument signal/noise ratio in the range of 2.5 to 5
    b. The concentration equivalent of three times the standard deviation of replicate measurement of the analyte in reagent water
    c. The region of the standard curve where there is a significant change in sensitivity (that is, a break in the slope of the standard curve)
2. Prepare (extract, digest) and analyze seven samples of a matrix spike (ASTM Type II water for aqueous methods, Ottawa sand for soil methods, glass beads of 1-mm diameter or smaller for metals) containing the analyte of interest at a concentration three to five times the estimated MDL.

3. Determine the variance (S^2) for each analyte as follows:

$$S^2 = \frac{1}{n-1}\left[\sum_{i=1}^{n}\left(x_i - \bar{x}\right)^2\right] \tag{1}$$

where:

x_i = the nth measurement of the variable x.

$\bar{x}$ = the average value of x.

$$\bar{X} = \frac{1}{n}\sum_{i=1}^{n} x_i \tag{2}$$

4. Find the standard deviation (s) for each analyte as follows:

$$s = (S^2)^{1/2} \tag{3}$$

5. Find the MDL for each analyte as follows:

$$\text{MDL} = 3.14(s) \tag{4}$$

(*Note:* 3.14 is the one-sided *t*-statistic at the 99 percent confidence level appropriate for calculating the MDL using seven samples.)

6. If the spike level used in Step 2 is more than 10 times the calculated MDL, repeat the process using a smaller spiking level.

4.2.2 Reporting Limits

Reporting limits will be greater than two times the laboratory-calculated MDL. Reporting limits used by the laboratory should not be greater than the detection limit objectives listed in Tables 4-2 through 4-13.

When instruments are calibrated, a standard at a concentration equal to or less than the reporting limit must be included. Reporting requirements are the following: Analytes at concentrations greater than the laboratory's MDL but less than the reporting limit will be flagged as estimated with a "J" qualifier and reported; analytes that are not detected at or above the laboratory's MDL will be reported as not detected at the reporting limit and flagged "U".

Reporting limits and sample results will be reported to two significant figures if less than 10 and to three significant figures if 10 or greater. Reporting limits will be reported on a dry-weight basis for sediment/soil samples. All quality control sample results will be reported to three significant figures.

4.2.3 Instrument Calibration

Laboratory instruments will be calibrated by qualified personnel before sample analysis, according to the procedures specified in each method. Calibration will be verified at method-specified intervals throughout the analysis sequence. The frequency and acceptance criteria for calibration are specified for each analytical method, with supplemental requirements defined below for organic methodologies. When multipoint calibration is specified, the concentrations of the calibration standards should bracket those expected in the samples. Samples will be diluted, if necessary, to bring analyte responses to within the calibration range. Data that exceed the calibration range cannot be reported by the laboratory. The initial calibration curve will be verified as accurate with a standard purchased or prepared from an independent second source. The initial calibration verification involves the analysis of a standard containing all the target analytes, typically in the middle of the calibration range, each time the initial calibration is performed. Quantitation based on extrapolation is not desirable.

Initial Calibration Models for the Determination of Organic Compounds

Organic methodologies often provide multiple options for initial calibration curve fits and associated acceptance criteria for use. The following sections outline required "good laboratory practices" that will be employed by the laboratory. The hierarchy that the laboratory will use when selecting the calibration curve fit for use in quantitation of sample results is also outlined below.

Calibration Techniques

- Verify that correct instrument operating conditions and routine maintenance as specified in the method and laboratory SOPs are employed. Document all maintenance activities in a laboratory notebook for troubleshooting and scheduling of future routine, periodic maintenance.
- Ensure that the instrument is free of contamination prior to calibration. Do *not* perform any blank subtraction.
- Perform the entire initial calibration before sample analyses. The calibration standards must be analyzed in a sequential order from the lowest to highest concentration. If one calibration standard fails to meet criteria, it may be reanalyzed at the end of the calibration sequence. Justification for removing a calibration point from the curve fit selected includes such items as improper purge, injection failure, non-spiked level, or other obvious failures. The failure of multiple standards suggests an instrument problem or operator error, and corrective action is required.

Only the lowest calibration point or the highest calibration point can be removed from the calibration curve without justification. If the lowest standard is removed, the reporting limit for that compound increases to the level of the next lowest calibration standard. Approval to elevate reporting limits greater than the project-specific objectives *must* be approved by the Project Chemist. If the highest standard is removed, the linear range is shortened for that compound.

The lowest standard in the calibration curve must be at or below the required reporting limit.

The other standard concentrations must define the working range of the instrument or the expected range of concentrations found in the samples.

Either external or internal calibration can be employed for methods not involving mass spectrometer detectors. Internal calibration must be used when a mass spectrometer detector is employed.

A minimum of five calibration points must be used for the calibration curve for gas chromatography/mass spectrometry and high-pressure liquid chromatography methods.

Most compounds tend to be linear, and a linear approach will be favored when linearity is suggested by the calibration data. Nonlinear calibration will be considered only when a linear approach cannot be applied. Before using a nonlinear calibration approach, the Project Chemist must be notified and provide approval. It is not acceptable to use an alternate calibration procedure when a compound fails to perform in the usual manner. When this occurs, it is indicative of instrument problem or operator error.

If a nonlinear calibration curve fit is employed, a minimum of six calibration levels must be used for second-order (quadratic) curves, and a third-order polynomial requires a minimum of seven calibration levels.

When more than five levels of standards are analyzed in anticipation of using second- or third-order calibration curves, all calibration points *must* be used regardless of the calibration option employed. The highest or lowest calibration point may be excluded to narrow the calibration range and meet the requirements for a specific calibration option. Otherwise, unjustified exclusion of calibration data is expressly forbidden.

If the initial calibration of a given analyte exhibits a relative standard deviation (RSD) greater than 20 percent, but the average RSD for all analytes is less than 20 percent, a list of those analytes that exceeded the criteria will be provided in the laboratory report. For analyses conducted under this QAPP, compounds outside these criteria and the actual values of the RSD will be listed in the case narrative.

Calibration Options

The following section outlines the acceptable calibration options and the hierarchy that the laboratory should use when selecting a specific option. The choice of calibration option may also be based on previous experience or a prior knowledge of detector response.

- **Linear calibration using average calibration or response factors**. Calibration factors for external calibrations or response factors for internal calibrations must have an RSD not exceeding 20 percent or 15 percent, respectively, to be used for quantitation. (For dioxins and furans by gas chromatography/mass spectrometry, the maximum RSDs are 20 percent for unlabeled standards and 30 percent for labeled standards.) A minimum response factor of 0.05 for most target analytes and 0.01 for the least-responsive target analytes must be achieved to ensure detectability.

- **Linear calibration using a linear regression equation ($y = mx + b$)**. The correlation coefficient must equal 0.995 or better. The line should *not* be forced through the origin. The equation and a plot of the linear regression must be included in the raw data generated by the laboratory and made available in the data package upon Honeywell's request.

- **A nonlinear calibration**. This model may be a second-order or third-order polynomial. The model must be continuous without a break in the function and should *not* be forced through the origin. The coefficient of determination of the nonlinear regression must be 0.99 or better. The equation and a plot of the nonlinear regression must be included in the raw data generated by the laboratory and made available in the data package upon Honeywell's request.

Continuing Calibration

Periodic verification of the initial calibration is essential in generating analytical data of known quality. The continuing calibration verification analyses ensure that the instrument has not been adversely affected by the sample matrix or other instrument failures that would increase or decrease the sensitivity or accuracy of the method. The laboratory will perform continuing calibration for all methods according to the specific requirements in the method and laboratory SOPs.

Method SW8000B allowed the use of the average of all analytes' percent-drift or recovery to meet the continuing calibration requirements for the method. However, Method 8000C, Section 9.3.1, clearly states that the use of the grand mean has been withdrawn—"therefore, the allowance for the use of the grand mean RSD to evaluate calibration linearity has been withdrawn and all target compounds should have RSDs less than or equal to 20%"—and is *not* allowed by the Honeywell Program QAPP. The use of this calibration verification approach must be approved by the Project Chemist.

4.3 Elements of Quality Control

Laboratory quality control checks indicate the state of control that prevailed at the time of sample analysis. Quality control checks that involve field samples, such as matrix, surrogate spikes, and field duplicates also indicate the presence of matrix effects. Field-originated blanks provide a way to monitor for potential contamination to which field samples are subjected. This QAPP specifies requirements for method blanks, LCSs, surrogate spikes, and MS/MSDs that laboratories participating in the data collection effort must follow. The CLP statement of work may require additional QC checks and not require some of them presented herein, and when required, the laboratory will adhere to the applicable CLP statement of work (SOW) for the analyses performed.

A laboratory QC batch is defined as a method blank, LCS, MS/MSD, or a sample duplicate, depending on the method, and 20 or fewer environmental samples of a similar matrix that are extracted or analyzed together. For gas chromatography/mass spectrometry volatile analyses, a method blank, LCS, and MS/MSD must be analyzed in each 12-hour time period. The number of environmental samples allowed in the laboratory quality control batch is defined by the remaining time in the method-prescribed 12-hour time period divided by the analytical run time. Each preparation or analytical batch will be identified in such a way as to be able to associate environmental samples with the appropriate laboratory quality control samples.

4.3.1 Quality Control Analyses/Parameters Originated by the Laboratory

Method Blank

Blanks are used to monitor each preparation or analytical batch for interference and contamination from glassware, reagents, and other potential sources within the laboratory. A method blank is an analyte-free matrix (laboratory reagent water for aqueous samples or Ottawa sand, sodium sulfate, or glass beads [metals] for soil samples) to which all reagents are added in the same amount or proportions as are added to the samples. It is processed through the entire sample preparation and analytical procedures along with the samples in the batch. There will be at least one method blank per preparation or analytical batch. If a target analyte is found at a concentration that exceeds the reporting limit, corrective action must be performed to identify and eliminate the contamination source. All associated samples must be reprepared and reanalyzed after the contamination source has been eliminated. No analytical data may be corrected for the concentration found in the blank.

Laboratory Control Sample

The LCS will consist of an analyte-free matrix such as laboratory reagent water for aqueous samples or Ottawa sand, sodium sulfate, or glass beads (metals) for soil samples spiked with known amounts of analytes that come from a source different than that used for calibration standards. Target analytes specified in the QAPP will be spiked into the LCS. The spike levels will be less than or equal to the midpoint of the calibration range. If LCS results are outside the specified control limits, corrective action must be taken, including sample repreparation and reanalysis, if appropriate. If more than one LCS is analyzed in a preparation or analytical batch, the results of all LCSs must be reported. Any LCS recovery outside quality control limits affects the accuracy for the entire batch and requires corrective action.

Surrogates

Surrogates are organic analytes that behave similarly to the analytes of interest but are not expected to occur naturally in the samples. They are spiked into the standards, samples, and QC samples prior to sample preparation. Recoveries of surrogates are used to indicate accuracy, method performance, and extraction efficiency. If surrogate recoveries are outside the specified control limits, corrective action must be taken, including sample repreparation and reanalysis, if appropriate.

Matrix Spike/Matrix Spike Duplicate

A matrix spike is a sample matrix fortified with known quantities of specific compounds. It is subjected to the same preparation and analytical procedures as the native sample. Target analytes specified in the QAPP are spiked into the sample. Matrix spike recoveries are used to evaluate the effect of the sample matrix on the recovery of the analytes of interest. An MSD is a second fortified sample matrix. The RPD between the results of the duplicate matrix spikes measures the precision of sample results. Only project-specific samples designated on the chain-of-custody form will be spiked. The spike levels will be less than or equal to the midpoint of the calibration range.

Internal Standards

Some methods require the use of internal standards to compensate for losses during injection or purging, or losses due to viscosity. Internal standards are compounds that have properties similar to those of the analytes of interest but are not expected to occur naturally in the samples. A measured amount of the internal standard is added to the standards, samples, and quality control samples following preparation. When the internal standard results are outside the control limits, corrective action must be taken, including sample reanalysis, if appropriate.

Laboratory Sample Duplicate

A sample duplicate selected by the laboratory is called a laboratory sample duplicate. It is subjected to the same preparation and analytical procedures as the native sample. The RPD between the results of the native sample and laboratory sample duplicate measures the precision of sample results. The data collected may also yield information regarding whether the sample matrix is heterogeneous.

Interference Check Samples

The interference check samples are used in inductively coupled plasma (ICP) analyses to verify background and inter-element correction factors. They consist of two solutions: *A* and *B*. Solution A contains the interfering analytes and Solution B contains both the analytes of interest and the interfering analytes. Both solutions are analyzed at the beginning and at the end of each analytical sequence. When the interference check samples results are outside the control limits, corrective action must be taken, including sample reanalysis, if appropriate.

Retention Time Windows

Retention time windows for gas and liquid chromatographic analyses must be established by replicate injections of the calibration standard over multiple days, as described in SW846 8000B, analytical method, or appropriate laboratory SOP. The absolute retention time of the calibration verification standard at the start of each analytical sequence will be used as the centerline of the window. For an analyte to be reported as positive, its elution time must be within the retention time window.

4.3.2 Quality Control Analyses Originated by the Field Team

Section 2.3 specifies the type and frequency of quality control samples that are originated by the field team.

4.4 Additional Quality Control Requirements

4.4.1 Holding Time

The holding time requirements specified in this QAPP must be met. For methods requiring both sample preparation and analysis, the preparation holding time will be calculated from the time of sampling to the completion of preparation. The analysis holding time will be calculated from the time of completion of preparation to the time of completion of the analysis, including any required dilutions, confirmation analysis, and reanalysis. For methods requiring analysis only, the holding time is calculated from the time of sampling to completion of the analysis, including any required dilutions, confirmation analysis, and reanalysis.

4.4.2 Confirmation

Confirmation analysis must be carried out as specified for specific methods when the result is at or above the reporting limit. The result designated as the primary result will be reported. All calibration and QC requirements must be met when confirmation analysis is carried out.

4.4.3 Cleanup Procedures to Minimize Matrix Effects

To maintain the lowest possible reporting limits, appropriate cleanup procedures will be employed when indicated by the method to remove or minimize matrix interference. Methods and materials for sample cleanup include, but are not limited to, gel permeation chromatography, silica gel, alumna, florisil, mercury (sulfur removal), sulfuric acid, and acid/base partitioning. Method blanks, MS/MSDs, and LCSs must be subjected to the same cleanup procedures performed on the samples to monitor the efficiencies of these procedures.

4.4.4 Sample Dilution

Dilution of a sample results in elevated reporting limits and ultimately affects the usability of data related to potential actions at the sampling site. It is important to minimize dilutions and maintain the lowest possible reporting limits. When dilutions are necessary because of high concentrations of target analytes, lesser dilutions should also be reported to fully characterize the sample for each analyte. The level of the lesser dilution will be such that it will provide the lowest possible reporting limits without having a lasting deleterious effect on the analytical instrumentation.

When a sample exhibits characteristics of matrix interference that are identified through analytical measurement or visual observation, appropriate cleanup procedure(s) must be proven ineffective or inappropriate before proceeding with dilution and analysis.

4.4.5 Standard Materials and Other Supplies and Consumables

Standard materials must be of known high purity and traceable to an approved source. Pure standards must not exceed the manufacturer's expiration date or 1 year following receipt, whichever comes first. Solutions prepared by the laboratory from the pure standards must be used within the expiration date specified in the laboratory's SOP.

All other supplies and consumables must be inspected prior to use to ensure that they meet the requirements specified in the appropriate SOP. The laboratory's inventory and storage system should ensure their use within the manufacturer's expiration date and that the supplies are stored under proper conditions.

4.4.6 Manual Integration

The laboratory is required to provide all analysts performing methods that rely on interpretation of chromatographic data with training on appropriate software or manual integration practices. The laboratory also will make every effort to minimize the use of manual integration of data. If manual integration is needed to correct a software auto-integration error, the manual integration will be clearly identified in the instrument data. Before-integration and after-integration enlargements of the region of the chromatogram where the manual integration was performed will be provided on an appropriate scale to allow an independent reviewer to evaluate the need and quality of the manual integration. The analyst will also document the reason for the manual integration on the chromatogram along with the date and his/her initials. The laboratory manager or designee will approve the manual integration by dating and initialing the chromatogram.

4.4.7 Laboratory Quality Assurance Program

The laboratory will maintain a QA manual or equivalent document. The QA manual will define the laboratory's internal QA/QC procedures, including the following:

- QA policies, objectives, and requirements
- Organization and personnel
- Document control
- SOPs (analytical methods and administrative)
- Data generation
- Software verification
- QA
- QC

- Nonconformance/corrective action procedures
- Data review

Laboratory SOPs

The laboratory will maintain SOPs for all analytical methods and laboratory operations. The format for SOPs will generally conform to the following references:

- "Test Methods for Evaluating Solid Waste, Physical and Chemical Methods," SW-846, 3rd Edition, Update III, Section 1 (EPA, 1996) and subsequent updates
- "Good Laboratory Practices in Principles and Guidance to Regulations for Ensuring Data Integrity in Automated Laboratory Operations" (EPA, 1995)

Each SOP must have a unique identification number that is traceable to previous revisions of the same document.

Demonstration of Capability

Laboratory quality assurance personnel will maintain records documenting the ability of each analyst to perform applicable method protocols. Documentation will include annual checks for each method and analyst. In addition, internal, blind performance evaluation samples for each method and matrix, demonstrating overall laboratory performance, must be submitted annually. The laboratory may receive additional blind performance evaluation samples in conjunction with this program.

4.5 EPA Pre-Methods

A bench-scale treatability test will be completed as part of this sampling event.

At a minimum, the bench test must demonstrate the effectiveness of the recommended design mixes through the performance of leaching tests on materials both before and after treatment using EPA Pre-method 1314 (untreated) and EPA Pre-method 1315 (treated). EPA Pre-method 1313 will also be evaluated during the bench testing phase. A summary of each method is outlined below.

4.5.1 Pre-Method 1313

Description

"Liquid-Solid Partitioning as a Function of Extract pH for Constituents in Solid Materials Using a Parallel Batch Extraction Procedure" is a leaching characterization test used to determine the liquid-solid partitioning (LSP) between water and a solid material at equilibrium over a broad range of pH. The procedure is composed of nine parallel batch extractions of particle-size reduced material over a pH range between 2 and 13 by the addition of predetermined amounts of acid or base to achieve specified final pH values.

Method Summary

A known mass of solid material is placed in each of nine extraction vessels and contacted with water at a liquid-solid ratio (L/S) of 10 mL/g dry sample (g-dry). Nitric acid or sodium hydroxide is added to each vessel to obtain a specified final pH value based on a pretest titration curve. The nine vessels are tumbled in an end-over-end fashion for a time commensurate with the maximum particle size. Eluate pH and conductivity are recorded. Analytical samples are filtered and preserved for chemical analysis. Constituent concentrations (mg/L) or mass release (mg/kg) are plotted as a function of eluate pH.

Constituent concentrations over the pH range typically show characteristic LSP behavior for cationic, amphoteric, oxyanionic, and highly soluble species. The results of this test are used to obtain maximum (available) release values, showing equilibrium concentrations when the environment dominates pH. Results form the basis for geochemical speciation modeling of release-controlling phases.

4.5.2 Pre-Method 1314

Description

"Liquid-Solid Partitioning as a Function of Liquid-Solid Ratio for Constituents in Solid Materials Using an Up-Flow Percolation Column Procedure" is a leaching characterization test consisting of continuous flow of eluent through a column of moderately packed granular material.

Method Summary

A solid material is packed into a glass column 5 cm in diameter by 30 cm long fitted with polytetrafloroethylene (PTFE) end caps. Deionized water or 1 mM calcium chloride as an eluent is introduced in an up-flow pumping mode and a series of nine sequential eluate samples are collected over specific L/S intervals. Up-flow pumping is used to minimize air entrainment and flow channeling. The default eluent for most materials is reagent water; however, a solution of 1 mM of calcium chloride in reagent water is specified when testing materials with either a high-clay or a high-organic-matter content to prevent deflocculation and colloid formation from clay and particulate organic matter aggregates from depletion of divalent cations. Method 1314 is intended to characterize the equilibrium between solid and liquid phases as soluble species are eluted, so the eluate flow rate is maintained between 0.5 and 1.0 L/S/day to increase the likelihood of local equilibrium. An elution rate of 0.75 L/S/day also provides a liquid phase mean residence time for flow through the column that is equivalent to the contact time for batch testing (Methods 1313 and 1316). The pH and conductivity of collected eluate fractions is recorded and analytical samples are filtered, preserved (as appropriate to specific chemical analyses), and chemically analyzed for constituents of potential concern (COPCs). Eluate data is plotted as a function of L/S. For the purposes of chemical speciation modeling, the entire eluent volume up to 10 mL/g-dry is analyzed in nine specific fractions. Options are included for applications where less detailed leaching information is required. These options include compositing collected eluate fractions to form a subset of analytical samples or collected of a limited subset of eluents fractions for analysis.

4.5.3 Pre-Method 1315

Description

"Mass Transfer Rates of Constituents in Monolithic or Compacted Granular Materials Using a Semi-dynamic Tank Leaching Procedure" is a leaching characterization procedure consisting of continuous emersion of a monolithic or compacted granular material in reagent water at a specified liquid-to-surface-area ratio (L/A).

Method Summary

This tank leaching method provides information on the rate of mass transport of constituents through a monolithic or compacted granular sample. Monolithic samples may be cylinders or parallelepipeds, while granular materials are compacted into cylindrical molds at optimum moisture content using Proctor compaction effort. The test sample is moved through a series of nine eluent-filled tanks of fresh reagent water at an L/A ratio of 9±1 mL/cm^2 following a schedule of predetermined test intervals. For each exchange, the sample is freely drained and the mass is recorded to monitor the amount of eluent absorbed into the solid matrix. The eluate pH and specific conductance is measured for each time interval, and analytical samples are collected and preserved accordingly based on the subsequent analytical methods. The outcome of Method 1315 is nine eluate solutions comprising a set of mass transfer leaching data. Eluate pH, conductivity, and analyte concentrations are plotted as a function of time and compared to internal and external quality control data. Mean interval flux and cumulative release are calculated based on eluate concentrations and plotted as a function of time. These data may be used to estimate constituent mass transfer parameters (such as observed diffusivity, tortuosity).

4.6 Additional Methods

In addition to the bench scale treatability testing which will allow us to evaluate remediation approaches, in-vitro bioaccessibility testing will also be performed on a subset of samples. Treated and untreated aliquots of samples will be analyzed to determine the effectiveness of iron-based treatments for arsenic-contaminated soils that have been shown to reduce the mobility and bioavailability/bioaccessibility of arsenic.

A subset of soil cores will be screened in the field for total arsenic concentrations using a handheld x-ray fluorescence (XRF) unit. Procedures for XRF screening are outlined in the project Field Sampling Plan and in the instrument operation manual.

4.7 Reporting Limits and Analytical Requirements

Tables 4-1 through 4-13 contain lists of target analytes, methods to be used, reporting limit objectives, and accuracy and precision limits specific to this project. The laboratory will adhere to the requirements specified within these tables. The reporting limits included herein reflect quantifiable levels that are attainable with a specified degree of confidence using the specified methods.

TABLE 4-1
Extraction and Digestion Methods
Quanta, Quality Assurance Project Plan

Analytical Method	Parameter	Preparatory Methods
SW846 6010B/7470A/7471A	Metals	SW3005A, SW3010A, Method Specified (7470A/7471A)
SW846 8260B/8015GRO	Volatiles & Gasoline Range Organics	SW5030B, SW5035
SW846 8270C/8270SIM/8015DRO	Semi-volatiles & Diesel Range Organics	SW3510C, SW3520C, SW3535, SW3540C, SW3541, SW3545, SW3550B

TABLE 4-2
Reporting Limit and Control Limit Objectives for Volatiles in Soils and Sediments, SW846 8260B
Quanta, Quality Assurance Project Plan

		Achievable Laboratory Limits				Control Limits (%)			
Analyte	**CAS No.**	**PAL (ug/Kg)**	**PQL (ug/Kg)**	**MDL (ug/Kg)**	**QL (ug/Kg)**	**MS/MSD**	**RPD**	**LCS**	**DUP**
Acetone	67-64-1	NA*	10	6.6	10	12-189	33	48-154	34
Benzene	71-43-2	NA*	1	0.13	1	37-132	21	76-120	14
Bromochloromethane	74-97-5	NA*	5	0.52	5	43-136	20	80-130	10
Bromodichloromethane	75-27-4	NA*	5	0.22	5	34-148	21	80-139	10
Bromoform	75-25-2	NA*	5	0.76	5	23-153	23	71-144	10
Bromomethane	74-83-9	NA*	5	0.39	5	10-150	27	56-142	10
2-Butanone (MEK)	78-93-3	NA*	10	4.3	10	21-179	29	61-141	10
Carbon disulfide	75-15-0	NA*	5	0.2	5	25-139	24	58-134	20
Carbon tetrachloride	56-23-5	NA*	5	0.35	5	25-156	24	64-156	10
Chlorobenzene	108-90-7	NA*	5	0.32	5	25-140	24	80-121	10
Chloroethane	75-00-3	NA*	5	0.41	5	15-143	26	57-138	10
Chloroform	67-66-3	NA*	5	0.48	5	42-134	21	77-130	10
Chloromethane	74-87-3	NA*	5	0.62	5	33-134	25	53-131	10
Cyclohexane	110-82-7	NA*	5	0.38	5	15-147	28	62-130	10
1,2-Dibromo-3-chloropropane	96-12-8	NA*	10	1.5	10	15-154	28	63-141	10
Dibromochloromethane	124-48-1	NA*	5	0.17	5	28-150	22	74-138	10
1,2-Dibromoethane	106-93-4	NA*	1	0.24	1	34-141	21	80-127	10
1,2-Dichlorobenzene	95-50-1	NA*	5	0.28	5	10-147	28	77-121	10
1,3-Dichlorobenzene	541-73-1	NA*	5	0.19	5	10-148	28	77-122	10
1,4-Dichlorobenzene	106-46-7	NA*	5	0.17	5	10-144	28	74-117	10
Dichlorodifluoromethane	75-71-8	NA*	5	0.32	5	18-162	26	36-149	10
1,1-Dichloroethane	75-34-3	NA*	5	0.22	5	44-131	21	75-129	10
1,2-Dichloroethane	107-06-2	NA*	1	0.18	1	39-144	20	70-145	10

TABLE 4-2
Reporting Limit and Control Limit Objectives for Volatiles in Soils and Sediments, SW846 8260B
Quanta, Quality Assurance Project Plan

		Achievable Laboratory Limits				Control Limits (%)			
Analyte	**CAS No.**	**PAL (ug/Kg)**	**PQL (ug/Kg)**	**MDL (ug/Kg)**	**QL (ug/Kg)**	**MS/MSD**	**RPD**	**LCS**	**DUP**
1,1-Dichloroethene	75-35-4	NA*	5	0.61	5	37-135	23	70-128	10
cis-1,2-Dichloroethene	156-59-2	NA*	5	0.32	5	38-134	21	76-135	18
trans-1,2-Dichloroethene	156-60-5	NA*	5	0.42	5	35-133	23	68-124	10
1,2-Dichloropropane	78-87-5	NA*	5	0.27	5	41-132	20	79-122	10
cis-1,3-Dichloropropene	10061-01-5	NA*	5	0.15	5	31-141	23	80-127	10
trans-1,3-Dichloropropene	10061-02-6	NA*	5	0.34	5	29-146	24	79-133	10
1,4-Dioxane	123-91-1	NA*	130	58	130	38-162	31	54-158	10
Ethylbenzene	100-41-4	NA*	1	0.15	1	20-144	25	75-125	12
Freon 113	76-13-1	NA*	5	0.72	5	22-155	26	62-144	10
2-Hexanone	591-78-6	NA*	5	2.5	5	15-172	30	61-142	10
Isopropylbenzene	98-82-8	NA*	5	0.14	5	14-146	27	67-126	10
Methyl Acetate	79-20-9	NA*	5	2.2	5	24-178	31	57-141	10
Methylcyclohexane	108-87-2	NA*	5	0.25	5	10-157	29	65-134	10
Methyl Tert Butyl Ether	1634-04-4	NA*	1	0.18	1	43-131	20	72-126	14
4-Methyl-2-pentanone(MIBK)	108-10-1	NA*	5	2.6	5	36-145	26	69-135	10
Methylene chloride	75-09-2	NA*	5	0.23	5	41-128	20	71-124	17
Styrene	100-42-5	NA*	5	0.19	5	13-154	25	77-128	10
1,1,2,2-Tetrachloroethane	79-34-5	NA*	5	0.18	5	30-134	26	71-122	10
Tetrachloroethene	127-18-4	NA*	5	0.19	5	18-163	26	70-137	20
Toluene	108-88-3	NA*	1	0.38	1	29-138	23	77-124	18
1,2,3-Trichlorobenzene	87-61-6	NA*	5	0.44	5	10-158	36	67-134	10
1,2,4-Trichlorobenzene	120-82-1	NA*	5	0.34	5	10-163	35	70-132	10
1,1,1-Trichloroethane	71-55-6	NA*	5	0.24	5	35-145	23	70-144	10

TABLE 4-2
Reporting Limit and Control Limit Objectives for Volatiles in Soils and Sediments, SW846 8260B
Quanta, Quality Assurance Project Plan

		Achievable Laboratory Limits				Control Limits (%)			
Analyte	**CAS No.**	**PAL (ug/Kg)**	**PQL (ug/Kg)**	**MDL (ug/Kg)**	**QL (ug/Kg)**	**MS/MSD**	**RPD**	**LCS**	**DUP**
1,1,2-Trichloroethane	79-00-5	NA*	5	0.43	5	37-140	22	81-127	10
Trichloroethene	79-01-6	NA*	5	0.25	5	28-151	23	80-129	15
Trichlorofluoromethane	75-69-4	NA*	5	0.48	5	29-154	25	59-149	10
Vinyl chloride	75-01-4	NA*	5	0.46	5	33-143	24	59-134	10
m,p-Xylene		NA*	1	0.31	1	17-145	25	77-124	10
o-Xylene	95-47-6	NA*	1	0.18	1	20-146	25	81-126	11
Xylene (total)	1330-20-7	NA*	1	0.18	1	18-145	25	78-124	14
Dibromofluoromethane	1868-53-7					Surrogate Limits:		67-131	
1,2-Dichloroethane-D4	17060-07-0					Surrogate Limits:		66-130	
Toluene-D8	2037-26-5					Surrogate Limits:		76-125	
4-Bromofluorobenzene	460-00-4					Surrogate Limits:		53-142	

Note:

* No project action limits (PAL) are required. The initial investigation results will become the PALs for future investigational events.

TABLE 4-3
Reporting Limit and Control Limit Objectives for Semi-volatiles in Soils and Sediments, SW846 8270C
Quanta, Quality Assurance Project Plan

		Achievable Laboratory Limits				Control Limits (%)			
Analyte	CAS No.	PAL (ug/Kg)	PQL (ug/Kg)	MDL (ug/Kg)	QL (ug/Kg)	MS/MSD	RPD	LCS	DUP
2-Chlorophenol	95-57-8	NA*	170	34	170	30-111	32	51-111	10
4-Chloro-3-methyl phenol	59-50-7	NA*	170	33	170	33-124	31	54-121	10
2,4-Dichlorophenol	120-83-2	NA*	170	54	170	31-121	33	51-120	10
2,4-Dimethylphenol	105-67-9	NA*	170	56	170	30-136	32	55-131	10
2,4-Dinitrophenol	51-28-5	NA*	670	41	670	10-131	48	19-144	10
4,6-Dinitro-o-cresol	534-52-1	NA*	670	41	670	10-123	48	33-126	10
2-Methylphenol	95-48-7	NA*	67	38	67	28-119	30	49-115	10
3&4-Methylphenol		NA*	67	42	67	27-120	32	49-115	10
2-Nitrophenol	88-75-5	NA*	170	35	170	24-118	35	47-122	10
4-Nitrophenol	100-02-7	NA*	330	56	330	10-137	43	10-137	10
Pentachlorophenol	87-86-5	NA*	330	57	330	11-121	35	17-126	10
Phenol	108-95-2	NA*	67	35	67	27-114	32	47-111	20
2,3,4,6-Tetrachlorophenol	58-90-2	NA*	170	34	170	26-119	34	43-116	10
2,4,5-Trichlorophenol	95-95-4	NA*	170	39	170	35-124	33	56-120	10
2,4,6-Trichlorophenol	88-06-2	NA*	170	31	170	34-122	31	55-118	10
Acenaphthene	83-32-9	NA*	33	9.7	33	30-122	31	55-114	10
Acenaphthylene	208-96-8	NA*	33	11	33	32-107	29	50-103	10
Acetophenone	98-86-2	NA*	170	5.9	170	28-126	33	53-121	10
Anthracene	120-12-7	NA*	33	12	33	33-130	30	59-121	36
Atrazine	1912-24-9	NA*	170	6.6	170	32-140	32	58-137	10
Benzo(a)anthracene	56-55-3	NA*	33	11	33	29-127	33	54-119	44
Benzo(a)pyrene	50-32-8	NA*	33	10	33	28-134	34	59-122	23
Benzo(b)fluoranthene	205-99-2	NA*	33	11	33	19-143	38	45-133	16

TABLE 4-3
Reporting Limit and Control Limit Objectives for Semi-volatiles in Soils and Sediments, SW846 8270C
Quanta, Quality Assurance Project Plan

		Achievable Laboratory Limits				Control Limits (%)			
Analyte	**CAS No.**	**PAL (ug/Kg)**	**PQL (ug/Kg)**	**MDL (ug/Kg)**	**QL (ug/Kg)**	**MS/MSD**	**RPD**	**LCS**	**DUP**
Benzo(g,h,i)perylene	191-24-2	NA*	33	12	33	27-135	34	57-122	61
Benzo(k)fluoranthene	207-08-9	NA*	33	13	33	20-138	40	49-131	7
4-Bromophenyl phenyl ether	101-55-3	NA*	67	12	67	35-127	29	58-122	10
Butyl benzyl phthalate	85-68-7	NA*	67	19	67	31-136	32	54-132	10
1,1'-Biphenyl	92-52-4	NA*	67	3.9	67	33-121	28	54-116	10
Benzaldehyde	100-52-7	NA*	170	7.7	170	18-128	33	32-125	10
2-Chloronaphthalene	91-58-7	NA*	67	10	67	34-113	29	53-113	10
4-Chloroaniline	106-47-8	NA*	170	11	170	10-109	35	26-102	10
Carbazole	86-74-8	NA*	67	15	67	37-126	31	60-121	10
Caprolactam	105-60-2	NA*	67	10	67	12-137	37	32-136	10
Chrysene	218-01-9	NA*	33	11	33	29-129	32	55-120	38
bis(2-Chloroethoxy)methane	111-91-1	NA*	67	13	67	28-121	32	49-120	10
bis(2-Chloroethyl)ether	111-44-4	NA*	67	10	67	19-116	33	42-113	10
bis(2-Chloroisopropyl)ether	108-60-1	NA*	67	9.9	67	22-112	31	36-118	10
4-Chlorophenyl phenyl ether	7005-72-3	NA*	67	10	67	36-118	28	53-117	10
2,4-Dinitrotoluene	121-14-2	NA*	67	15	67	28-128	34	57-122	10
2,6-Dinitrotoluene	606-20-2	NA*	67	13	67	31-133	31	51-133	10
3,3'-Dichlorobenzidine	91-94-1	NA*	170	8.5	170	10-124	39	27-121	10
Dibenzo(a,h)anthracene	53-70-3	NA*	33	11	33	32-135	34	58-125	13
Dibenzofuran	132-64-9	NA*	67	9.9	67	34-118	30	57-111	10
Di-n-butyl phthalate	84-74-2	NA*	67	7.4	67	37-128	29	59-125	10
Di-n-octyl phthalate	117-84-0	NA*	67	16	67	29-139	33	53-136	10
Diethyl phthalate	84-66-2	NA*	67	11	67	36-121	30	56-118	10

TABLE 4-3
Reporting Limit and Control Limit Objectives for Semi-volatiles in Soils and Sediments, SW846 8270C
Quanta, Quality Assurance Project Plan

		Achievable Laboratory Limits				Control Limits (%)			
Analyte	**CAS No.**	**PAL (ug/Kg)**	**PQL (ug/Kg)**	**MDL (ug/Kg)**	**QL (ug/Kg)**	**MS/MSD**	**RPD**	**LCS**	**DUP**
Dimethyl phthalate	131-11-3	NA*	67	12	67	37-121	29	57-116	10
bis(2-Ethylhexyl)phthalate	117-81-7	NA*	67	29	67	26-145	34	54-133	10
Fluoranthene	206-44-0	NA*	33	15	33	25-132	33	57-119	38
Fluorene	86-73-7	NA*	33	11	33	32-125	32	57-117	10
Hexachlorobenzene	118-74-1	NA*	67	11	67	34-122	29	55-122	10
Hexachlorobutadiene	87-68-3	NA*	33	9.3	33	26-119	32	43-126	10
Hexachlorocyclopentadiene	77-47-4	NA*	670	34	670	10-146	42	24-167	10
Hexachloroethane	67-72-1	NA*	170	9.3	170	22-104	32	44-113	10
Indeno(1,2,3-cd)pyrene	193-39-5	NA*	33	12	33	29-138	35	57-127	54
Isophorone	78-59-1	NA*	67	9	67	26-121	31	42-124	10
2-Methylnaphthalene	91-57-6	NA*	67	19	67	23-121	32	46-114	10
2-Nitroaniline	88-74-4	NA*	170	15	170	28-135	32	47-132	10
3-Nitroaniline	99-09-2	NA*	170	13	170	16-115	36	34-106	10
4-Nitroaniline	100-01-6	NA*	170	13	170	17-121	36	46-121	10
Naphthalene	91-20-3	NA*	33	9.1	33	25-117	32	49-111	10
Nitrobenzene	98-95-3	NA*	67	9.6	67	27-115	32	48-114	10
N-Nitroso-di-n-propylamine	621-64-7	NA*	67	8.1	67	26-119	32	44-119	10
N-Nitrosodiphenylamine	86-30-6	NA*	170	20	170	33-132	30	58-117	10
Phenanthrene	85-01-8	NA*	33	15	33	28-132	34	58-118	91
Pyrene	129-00-0	NA*	33	13	33	27-132	33	54-122	67
1,2,4,5-Tetrachlorobenzene	95-94-3	NA*	170	10	170	28-120	29	44-126	10
2-Fluorophenol	367-12-4					Surrogate Limits:		21-116	
Phenol-d5	4165-62-2					Surrogate Limits:		19-117	

TABLE 4-3
Reporting Limit and Control Limit Objectives for Semi-volatiles in Soils and Sediments, SW846 8270C
Quanta, Quality Assurance Project Plan

		Achievable Laboratory Limits				Control Limits (%)			
Analyte	**CAS No.**	**PAL (ug/Kg)**	**PQL (ug/Kg)**	**MDL (ug/Kg)**	**QL (ug/Kg)**	**MS/MSD**	**RPD**	**LCS**	**DUP**
2-Chlorophenol-D4						Surrogate Limits:		70-130	
2,4,6-Tribromophenol	118-79-6					Surrogate Limits:		24-136	
1,2-Dichlorobenzene-d4	2199-69-1					Surrogate Limits:		70-130	
Nitrobenzene-d5	4165-60-0					Surrogate Limits:		21-122	
2-Fluorobiphenyl	321-60-8					Surrogate Limits:		30-117	
o-Terphenyl	84-15-1					Surrogate Limits:		13-131	
2-Bromonaphthalene	580-13-2					Surrogate Limits:		20-112	
Terphenyl-d14	1718-51-0					Surrogate Limits:		31-129	

Notes:

* No project action limits (PAL) are required. The initial investigation results will become the PALs for future investigational events.

TABLE 4-4
Reporting Limit and Control Limit Objectives for Total Petroleum Hydrocarbons in Soil and Sediments, SW846 8015B
Quanta, Quality Assurance Project Plan

		Achievable Laboratory Limits				Control Limits (%)			
Analyte	**CAS No.**	**PAL (mg/Kg)**	**PQL (mg/Kg)**	**MDL (mg/Kg)**	**QL (mg/Kg)**	**MS/MSD**	**RPD**	**LCS**	**DUP**
TPH-GRO (C6-C10)		NA*	10	1.8	10	61-128	14	70-120	30
aaa-Trifluorotoluene	98-08-8					Surrogate Limits:		66-119	
TPH-DRO (C10-C28)		NA*	6.7	0.21	6.7	10-151	47	45-124	30
o-Terphenyl	84-15-1					Surrogate Limits:		19-151	
Tetracosane-d50	16416-32-3					Surrogate Limits:		18-146	
5a-Androstane	438-22-2					Surrogate Limits:		14-147	

Notes:

* No project action limits (PAL) are required. The initial investigation results will become the PALs for future investigational events.

TABLE 4-5
Reporting Limit and Control Limit Objectives for Metals in Soils and Sediments, SW846 6010B/7471A
Quanta, Quality Assurance Project Plan

		Achievable Laboratory Limits				Control Limits (%)			
Analyte	**CAS No.**	**PAL (mg/Kg)**	**PQL (mg/Kg)**	**MDL (mg/Kg)**	**QL (mg/Kg)**	**MS/MSD**	**RPD**	**LCS**	**DUP**
Aluminum	7429-90-5	NA*	50	2.144	50	75-125	35	80-120	35
Antimony	7440-36-0	NA*	2	0.212	2	75-125	35	80-120	35
Arsenic	7440-38-2	NA*	2	0.44	2	75-125	35	80-120	35
Barium	7727-43-7	NA*	20	0.027	20	75-125	35	80-120	35
Beryllium	7440-41-7	NA*	0.2	0.01	0.2	75-125	35	80-120	35
Cadmium	7440-43-9	NA*	0.5	0.071	0.5	75-125	35	80-120	35
Calcium	7789-78-8	NA*	500	4.957	500	75-125	35	80-120	35
Chromium	7440-47-3	NA*	1	0.12	1	75-125	35	80-120	35
Cobalt	7440-48-4	NA*	5	0.08	5	75-125	35	80-120	35
Copper	7440-50-8	NA*	2.5	0.113	2.5	75-125	35	80-120	35
Iron	7439-89-6	NA*	50	2.355	50	75-125	35	80-120	35
Lead	7439-92-1	NA*	2	0.365	2	75-125	35	80-120	35
Magnesium	7439-95-4	NA*	500	1.352	500	75-125	35	80-120	35
Manganese	7439-96-5	NA*	1.5	0.039	1.5	75-125	35	80-120	35
Mercury	7439-97-6	NA*	0.034	0.00983	0.034	75-125	35	80-120	35
Nickel	7440-02-0	NA*	4	0.146	4	75-125	35	80-120	35
Potassium	7722-64-7	NA*	1000	3.159	1000	75-125	35	80-120	35
Selenium	7782-49-2	NA*	2	0.435	2	75-125	35	80-120	35
Silver	7440-22-4	NA*	0.5	0.041	0.5	75-125	35	80-120	35
Sodium	7646-69-7	NA*	1000	25.11	1000	75-125	35	80-120	35
Thallium	7440-32-6	NA*	1	0.894	1	75-125	35	80-120	35
Vanadium	7440-62-2	NA*	5	0.087	5	75-125	35	80-120	35
Zinc	7440-66-6	NA*	2	0.173	2	75-125	35	80-120	35

Notes:

* No project action limits (PAL) are required. The initial investigation results will become the PALs for future investigational events.

TABLE 4-6
Reporting Limit and Control Limit Objectives for Volatiles in Water, SW846 8260B
Quanta, Quality Assurance Project Plan

		Achievable Laboratory Limits				Control Limits (%)			
Analyte	**CAS No.**	**PAL (ug/L)**	**PQL (ug/L)**	**MDL (ug/L)**	**QL (ug/L)**	**MS/MSD**	**RPD**	**LCS**	**DUP**
Acetone	67-64-1	NA*	10	7.6	10	39-150	20	49-142	16
Benzene	71-43-2	NA*	1	0.22	1	40-139	12	76-119	10
Bromochloromethane	74-97-5	NA*	5	0.4	5	67-134	12	77-129	10
Bromodichloromethane	75-27-4	NA*	1	0.23	1	68-135	12	81-133	12
Bromoform	75-25-2	NA*	4	0.24	4	55-141	14	72-139	10
Bromomethane	74-83-9	NA*	2	0.31	2	49-145	16	55-140	10
2-Butanone (MEK)	78-93-3	NA*	10	2.9	10	55-141	15	64-132	10
Carbon disulfide	75-15-0	NA*	2	0.18	2	23-153	19	45-149	10
Carbon tetrachloride	56-23-5	NA*	1	0.19	1	52-155	16	74-146	10
Chlorobenzene	108-90-7	NA*	1	0.22	1	66-129	11	79-120	10
Chloroethane	75-00-3	NA*	1	0.37	1	50-140	16	60-134	10
Chloroform	67-66-3	NA*	1	0.21	1	63-133	13	77-127	11
Chloromethane	74-87-3	NA*	1	0.22	1	43-138	17	50-128	10
Cyclohexane	110-82-7	NA*	5	0.29	5	35-151	17	65-128	10
1,2-Dibromo-3-chloropropane	96-12-8	NA*	10	1.3	10	57-142	14	64-137	10
Dibromochloromethane	124-48-1	NA*	1	0.2	1	64-136	12	77-131	10
1,2-Dibromoethane	106-93-4	NA*	2	0.21	2	69-132	11	76-127	10
1,2-Dichlorobenzene	95-50-1	NA*	1	0.18	1	69-129	11	78-123	10
1,3-Dichlorobenzene	541-73-1	NA*	1	0.29	1	66-130	12	77-124	10
1,4-Dichlorobenzene	106-46-7	NA*	1	0.26	1	66-127	12	76-121	10
Dichlorodifluoromethane	75-71-8	NA*	5	0.31	5	31-166	20	41-138	10
1,1-Dichloroethane	75-34-3	NA*	1	0.19	1	58-132	13	74-124	10

TABLE 4-6
Reporting Limit and Control Limit Objectives for Volatiles in Water, SW846 8260B
Quanta, Quality Assurance Project Plan

		Achievable Laboratory Limits				Control Limits (%)			
Analyte	**CAS No.**	**PAL (ug/L)**	**PQL (ug/L)**	**MDL (ug/L)**	**QL (ug/L)**	**MS/MSD**	**RPD**	**LCS**	**DUP**
1,2-Dichloroethane	107-06-2	NA*	1	0.18	1	62-145	12	71-138	10
1,1-Dichloroethene	75-35-4	NA*	1	0.28	1	43-142	17	68-126	10
cis-1,2-Dichloroethene	156-59-2	NA*	1	0.22	1	55-132	12	78-131	10
trans-1,2-Dichloroethene	156-60-5	NA*	1	0.31	1	53-132	14	64-119	10
1,2-Dichloropropane	78-87-5	NA*	1	0.22	1	65-128	12	76-121	10
cis-1,3-Dichloropropene	10061-01-5	NA*	1	0.22	1	66-130	12	76-123	10
trans-1,3-Dichloropropene	10061-02-6	NA*	1	0.19	1	64-135	13	74-129	10
1,4-Dioxane	123-91-1	NA*	130	72	130	49-152	24	54-149	10
Ethylbenzene	100-41-4	NA*	1	0.21	1	40-140	12	77-119	12
Freon 113	76-13-1	NA*	5	0.49	5	38-159	18	64-145	10
2-Hexanone	591-78-6	NA*	5	3	5	56-140	17	63-135	10
Isopropylbenzene	98-82-8	NA*	2	0.19	2	56-138	13	74-125	10
Methyl Acetate	79-20-9	NA*	5	2.9	5	42-144	17	54-135	10
Methylcyclohexane	108-87-2	NA*	5	0.18	5	36-152	17	65-134	13
Methyl Tert Butyl Ether	1634-04-4	NA*	1	0.18	1	54-136	12	72-125	16
4-Methyl-2-pentanone(MIBK)	108-10-1	NA*	5	1.2	5	61-138	14	68-131	10
Methylene chloride	75-09-2	NA*	2	0.2	2	60-130	13	73-122	10
Styrene	100-42-5	NA*	5	0.23	5	59-132	13	77-121	10
1,1,2,2-Tetrachloroethane	79-34-5	NA*	1	0.2	1	65-128	12	70-121	10
Tetrachloroethene	127-18-4	NA*	1	0.32	1	52-143	15	64-148	13
Toluene	108-88-3	NA*	1	0.15	1	47-140	12	77-122	10
1,2,3-Trichlorobenzene	87-61-6	NA*	5	0.69	5	62-137	14	69-136	10
1,2,4-Trichlorobenzene	120-82-1	NA*	5	0.15	5	64-136	14	73-133	10

TABLE 4-6
Reporting Limit and Control Limit Objectives for Volatiles in Water, SW846 8260B
Quanta, Quality Assurance Project Plan

		Achievable Laboratory Limits				Control Limits (%)			
Analyte	**CAS No.**	**PAL (ug/L)**	**PQL (ug/L)**	**MDL (ug/L)**	**QL (ug/L)**	**MS/MSD**	**RPD**	**LCS**	**DUP**
1,1,1-Trichloroethane	71-55-6	NA*	1	0.24	1	55-146	15	76-135	10
1,1,2-Trichloroethane	79-00-5	NA*	1	0.23	1	70-129	12	79-125	10
Trichloroethene	79-01-6	NA*	1	0.21	1	54-142	14	80-129	12
Trichlorofluoromethane	75-69-4	NA*	5	0.35	5	45-159	19	66-145	10
Vinyl chloride	75-01-4	NA*	1	0.27	1	42-145	18	56-133	10
m,p-Xylene		NA*	1	0.32	1	39-141	12	77-121	12
o-Xylene	95-47-6	NA*	1	0.17	1	51-138	12	80-124	12
Xylene (total)	1330-20-7	NA*	1	0.17	1	42-140	12	78-121	13
Dibromofluoromethane	1868-53-7					Surrogate Limits:		77-120	
1,2-Dichloroethane-D4	17060-07-0					Surrogate Limits:		70-127	
Toluene-D8	2037-26-5					Surrogate Limits:		79-120	
4-Bromofluorobenzene	460-00-4					Surrogate Limits:		76-118	

Notes:

* No project action limits (PAL) are required. The initial investigation results will become the PALs for future investigational events.

TABLE 4-7
Reporting Limit and Control Limit Objectives for Semi-volatiles in Water, SW846 8270C
Quanta, Quality Assurance Project Plan

		Achievable Laboratory Limits				Control Limits (%)			
Analyte	**CAS No.**	**PAL (ug/L)**	**PQL (ug/L)**	**MDL (ug/L)**	**QL (ug/L)**	**MS/MSD**	**RPD**	**LCS**	**DUP**
2-Chlorophenol	95-57-8	NA*	5	0.97	5	32-117	29	47-107	10
4-Chloro-3-methyl phenol	59-50-7	NA*	5	1.8	5	48-134	21	55-126	10
2,4-Dichlorophenol	120-83-2	NA*	5	1.2	5	34-129	28	51-124	10
2,4-Dimethylphenol	105-67-9	NA*	5	1.5	5	50-140	20	54-132	10
2,4-Dinitrophenol	51-28-5	NA*	20	17	20	10-156	41	16-156	10
4,6-Dinitro-o-cresol	534-52-1	NA*	20	0.99	20	10-139	36	30-138	10
2-Methylphenol	95-48-7	NA*	2	1	2	34-120	25	34-109	10
3&4-Methylphenol		NA*	2	0.93	2	31-121	28	26-106	10
2-Nitrophenol	88-75-5	NA*	5	1.5	5	30-130	29	49-126	10
4-Nitrophenol	100-02-7	NA*	10	5.2	10	10-115	43	10-86	10
Pentachlorophenol	87-86-5	NA*	10	1.4	10	10-136	36	27-127	10
Phenol	108-95-2	NA*	2	1.3	2	10-91	36	10-78	10
2,3,4,6-Tetrachlorophenol	58-90-2	NA*	5	0.94	5	24-129	32	48-120	10
2,4,5-Trichlorophenol	95-95-4	NA*	5	1.6	5	33-136	29	55-128	10
2,4,6-Trichlorophenol	88-06-2	NA*	5	1.3	5	29-133	30	55-124	10
Acenaphthene	83-32-9	NA*	1	0.26	1	55-119	21	57-118	10
Acenaphthylene	208-96-8	NA*	1	0.23	1	47-110	20	49-110	10
Acetophenone	98-86-2	NA*	2	0.29	2	48-145	23	60-132	10
Anthracene	120-12-7	NA*	1	0.29	1	59-128	21	63-128	10
Atrazine	1912-24-9	NA*	5	0.49	5	48-159	22	64-150	10
Benzaldehyde	100-52-7	NA*	5	3.3	5	25-152	25	39-146	10
Benzo(a)anthracene	56-55-3	NA*	1	0.23	1	54-124	21	59-124	10
Benzo(a)pyrene	50-32-8	NA*	1	0.23	1	57-129	21	63-129	10

TABLE 4-7
Reporting Limit and Control Limit Objectives for Semi-volatiles in Water, SW846 8270C
Quanta, Quality Assurance Project Plan

		Achievable Laboratory Limits				Control Limits (%)			
Analyte	**CAS No.**	**PAL (ug/L)**	**PQL (ug/L)**	**MDL (ug/L)**	**QL (ug/L)**	**MS/MSD**	**RPD**	**LCS**	**DUP**
Benzo(b)fluoranthene	205-99-2	NA*	1	0.46	1	46-138	28	50-139	10
Benzo(g,h,i)perylene	191-24-2	NA*	1	0.32	1	52-135	23	61-132	10
Benzo(k)fluoranthene	207-08-9	NA*	1	0.51	1	45-141	30	53-140	10
4-Bromophenyl phenyl ether	101-55-3	NA*	2	0.36	2	56-128	21	61-127	10
Butyl benzyl phthalate	85-68-7	NA*	2	0.29	2	50-142	23	55-139	10
1,1'-Biphenyl	92-52-4	NA*	1	0.3	1	51-125	23	57-120	10
2-Chloronaphthalene	91-58-7	NA*	2	0.3	2	50-115	22	51-115	10
4-Chloroaniline	106-47-8	NA*	5	0.53	5	20-116	31	35-114	10
Carbazole	86-74-8	NA*	1	0.36	1	59-131	20	65-129	10
Caprolactam	105-60-2	NA*	2	0.69	2	10-85	43	1-78	10
Chrysene	218-01-9	NA*	1	0.29	1	55-127	20	59-128	10
bis(2-Chloroethoxy)methane	111-91-1	NA*	2	0.31	2	52-127	22	56-127	10
bis(2-Chloroethyl)ether	111-44-4	NA*	2	0.31	2	44-122	25	51-120	10
bis(2-Chloroisopropyl)ether	108-60-1	NA*	2	0.45	2	37-124	22	38-125	10
4-Chlorophenyl phenyl ether	7005-72-3	NA*	2	0.31	2	54-122	20	58-122	10
2,4-Dinitrotoluene	121-14-2	NA*	2	0.43	2	55-130	22	63-127	10
2,6-Dinitrotoluene	606-20-2	NA*	2	0.46	2	55-142	20	59-140	10
3,3'-Dichlorobenzidine	91-94-1	NA*	5	0.36	5	10-143	35	26-139	10
Dibenzo(a,h)anthracene	53-70-3	NA*	1	0.38	1	54-136	23	61-135	10
Dibenzofuran	132-64-9	NA*	5	0.27	5	57-118	21	60-116	10
Di-n-butyl phthalate	84-74-2	NA*	2	0.56	2	57-137	21	62-136	10
Di-n-octyl phthalate	117-84-0	NA*	2	0.31	2	52-145	22	59-142	10
Diethyl phthalate	84-66-2	NA*	2	0.33	2	49-132	22	53-131	10

TABLE 4-7
Reporting Limit and Control Limit Objectives for Semi-volatiles in Water, SW846 8270C
Quanta, Quality Assurance Project Plan

		Achievable Laboratory Limits				Control Limits (%)			
Analyte	**CAS No.**	**PAL (ug/L)**	**PQL (ug/L)**	**MDL (ug/L)**	**QL (ug/L)**	**MS/MSD**	**RPD**	**LCS**	**DUP**
Dimethyl phthalate	131-11-3	NA*	2	0.28	2	36-135	26	37-137	10
bis(2-Ethylhexyl)phthalate	117-81-7	NA*	2	0.59	2	51-146	24	59-141	10
Fluoranthene	206-44-0	NA*	1	0.32	1	55-129	20	61-129	10
Fluorene	86-73-7	NA*	1	0.28	1	57-125	21	62-124	10
Hexachlorobenzene	118-74-1	NA*	1	0.34	1	53-128	21	58-127	10
Hexachlorobutadiene	87-68-3	NA*	1	0.51	1	27-122	27	17-120	10
Hexachlorocyclopentadiene	77-47-4	NA*	20	7.1	20	10-165	30	13-160	10
Hexachloroethane	67-72-1	NA*	2	0.55	2	24-108	28	18-106	10
Indeno(1,2,3-cd)pyrene	193-39-5	NA*	1	0.37	1	53-138	23	59-138	10
Isophorone	78-59-1	NA*	2	0.27	2	42-139	20	44-141	10
2-Methylnaphthalene	91-57-6	NA*	1	0.38	1	41-118	22	45-110	10
2-Nitroaniline	88-74-4	NA*	5	1.1	5	45-151	25	50-147	10
3-Nitroaniline	99-09-2	NA*	5	1.3	5	28-120	28	44-116	10
4-Nitroaniline	100-01-6	NA*	5	1.7	5	32-131	28	50-125	10
Naphthalene	91-20-3	NA*	1	0.26	1	40-116	24	47-107	10
Nitrobenzene	98-95-3	NA*	2	0.42	2	48-122	22	53-118	10
N-Nitroso-di-n-propylamine	621-64-7	NA*	2	0.3	2	44-136	22	50-134	10
N-Nitrosodiphenylamine	86-30-6	NA*	5	0.31	5	52-130	23	61-121	10
Phenanthrene	85-01-8	NA*	1	0.29	1	57-126	21	62-124	10
Pyrene	129-00-0	NA*	1	0.27	1	50-128	21	56-126	10
1,2,4,5-Tetrachlorobenzene	95-94-3	NA*	2	0.31	2	39-129	22	35-129	10
2-Fluorophenol	367-12-4					Surrogate Limits:		10-83	
Phenol-d5	4165-62-2					Surrogate Limits:		10-74	

TABLE 4-7
Reporting Limit and Control Limit Objectives for Semi-volatiles in Water, SW846 8270C
Quanta, Quality Assurance Project Plan

		Achievable Laboratory Limits				Control Limits (%)			
Analyte	**CAS No.**	**PAL (ug/L)**	**PQL (ug/L)**	**MDL (ug/L)**	**QL (ug/L)**	**MS/MSD**	**RPD**	**LCS**	**DUP**
2-Chlorophenol-D4						Surrogate Limits:		70-130	
2,4,6-Tribromophenol	118-79-6					Surrogate Limits:		24-148	
1,2-Dichlorobenzene-d4	2199-69-1					Surrogate Limits:		70-130	
Nitrobenzene-d5	4165-60-0					Surrogate Limits:		38-129	
2-Fluorobiphenyl	321-60-8					Surrogate Limits:		42-117	
Terphenyl-d14	1718-51-0					Surrogate Limits:		14-132	

Notes:

* No project action limits (PAL) are required. The initial investigation results will become the PALs for future investigational events.

TABLE 4-8
Reporting Limit and Control Limit Objectives for Semi-volatiles/PAHs in Water, SW846 8270SIM
Quanta, Quality Assurance Project Plan

		Achievable Laboratory Limits				Control Limits (%)			
Analyte	**CAS No.**	**PAL (ug/L)**	**PQL (ug/L)**	**MDL (ug/L)**	**QL (ug/L)**	**MS/MSD**	**RPD**	**LCS**	**DUP**
Pentachlorophenol	87-86-5	NA*	0.3	0.29	0.3	10-139	41	10-180	20
Acenaphthene	83-32-9	NA*	0.1	0.014	0.1	51-116	20	45-125	20
Acenaphthylene	208-96-8	NA*	0.1	0.016	0.1	47-107	20	37-118	20
Anthracene	120-12-7	NA*	0.1	0.01	0.1	55-121	21	48-136	20
Benzo(a)anthracene	56-55-3	NA*	0.1	0.015	0.1	51-120	20	33-136	20
Benzo(a)pyrene	50-32-8	NA*	0.1	0.0049	0.1	45-128	20	44-123	20
Benzo(b)fluoranthene	205-99-2	NA*	0.1	0.016	0.1	38-137	28	32-146	20
Benzo(g,h,i)perylene	191-24-2	NA*	0.1	0.01	0.1	34-138	23	47-129	20
Benzo(k)fluoranthene	207-08-9	NA*	0.1	0.013	0.1	34-136	30	34-154	20
Chrysene	218-01-9	NA*	0.1	0.023	0.1	50-123	21	43-143	20
Dibenzo(a,h)anthracene	53-70-3	NA*	0.1	0.023	0.1	35-142	25	43-144	20
Fluoranthene	206-44-0	NA*	0.1	0.0096	0.1	51-126	20	46-122	20
Fluorene	86-73-7	NA*	0.1	0.015	0.1	53-122	22	49-125	20
Hexachlorobenzene	118-74-1	NA*	0.02	0.008	0.02	48-129	23	30-138	20
Indeno(1,2,3-cd)pyrene	193-39-5	NA*	0.1	0.011	0.1	36-140	25	45-142	20
Naphthalene	91-20-3	NA*	0.1	0.016	0.1	36-119	21	36-128	20
Phenanthrene	85-01-8	NA*	0.1	0.016	0.1	49-126	20	41-129	20
Pyrene	129-00-0	NA*	0.1	0.0081	0.1	52-122	22	47-130	20
2-Fluorophenol	367-12-4					Surrogate Limits:		10-110	
Phenol-d5	4165-62-2					Surrogate Limits:		10-110	
2,4,6-Tribromophenol	118-79-6					Surrogate Limits:		10-157	
Nitrobenzene-d5	4165-60-0					Surrogate Limits:		23-131	
2-Fluorobiphenyl	321-60-8					Surrogate Limits:		24-120	

TABLE 4-8
Reporting Limit and Control Limit Objectives for Semi-volatiles/PAHs in Water, SW846 8270SIM
Quanta, Quality Assurance Project Plan

		Achievable Laboratory Limits				Control Limits (%)			
Analyte	CAS No.	PAL (ug/L)	PQL (ug/L)	MDL (ug/L)	QL (ug/L)	MS/MSD	RPD	LCS	DUP
Terphenyl-d14	1718-51-0					Surrogate Limits:		10-125	
1,4-Dithiane-d4						Surrogate Limits:		10-140	
Diisopropyl methylphosphonate-d14						Surrogate Limits:		10-124	

Notes:

* No project action limits (PAL) are required. The initial investigation results will become the PALs for future investigational events.

TABLE 4-9
Reporting Limit and Control Limit Objectives for Total Petroleum Hydrocarbons in Water, SW846 8015B
Quanta, Quality Assurance Project Plan

		Achievable Laboratory Limits				Control Limits (%)			
Analyte	CAS No.	PAL (mg/L)	PQL (mg/L)	MDL (mg/L)	QL (mg/L)	MS/MSD	RPD	LCS	DUP
TPH-GRO (C6-C10)		NA*	0.2	0.016	0.2	46-131	20	72-125	8
aaa-Trifluorotoluene	98-08-8					Surrogate Limits:		68-114	
TPH-DRO (C10-C28)		NA*	0.1	0.0035	0.1	10-132	38	36-118	10
o-Terphenyl	84-15-1				0.1	Surrogate Limits:		34-131	
Tetracosane-d50	16416-32-3				0.1	Surrogate Limits:		15-119	
5a-Androstane	438-22-2				0.1	Surrogate Limits:		11-119	

Notes:

* No project action limits (PAL) are required. The initial investigation results will become the PALs for future investigational events.

TABLE 4-10
Reporting Limit and Control Limit Objectives for Metals in Water, SW846 6010B/7470A
Quanta, Quality Assurance Project Plan

		Achievable Laboratory Limits				Control Limits (%)			
Analyte	**CAS No.**	**PAL (ug/L)**	**PQL (ug/L)**	**MDL (ug/L)**	**QL (ug/L)**	**MS/MSD**	**RPD**	**LCS**	**DUP**
Aluminum	7429-90-5	NA*	200.0	7.49	200.0	75-125	20	80-120	20
Antimony	7440-36-0	NA*	6.0	4.53	6.0	75-125	20	80-120	20
Arsenic	7440-38-2	NA*	8.0	2.68	8.0	75-125	20	80-120	20
Barium	7727-43-7	NA*	200.0	0.74	200.0	75-125	20	80-120	20
Beryllium	7440-41-7	NA*	1.0	0.13	1.0	75-125	20	80-120	20
Cadmium	7440-43-9	NA*	3.0	0.49	3.0	75-125	20	80-120	20
Calcium	7789-78-8	NA*	5000.0	26.07	5000.0	75-125	20	80-120	20
Chromium	7440-47-3	NA*	10.0	0.83	10.0	75-125	20	80-120	20
Cobalt	7440-48-4	NA*	50.0	0.75	50.0	75-125	20	80-120	20
Copper	7440-50-8	NA*	10.0	1.91	10.0	75-125	20	80-120	20
Iron	7439-89-6	NA*	100.0	59.88	100.0	75-125	20	80-120	20
Lead	7439-92-1	NA*	3.0	1.09	3.0	75-125	20	80-120	20
Magnesium	7439-95-4	NA*	5000.0	17.32	5000.0	75-125	20	80-120	20
Manganese	7439-96-5	NA*	15.0	0.45	15.0	75-125	20	80-120	20
Mercury	7439-97-6	NA*	0.200	0.088	0.200	75-125	20	80-120	20
Nickel	7440-02-0	NA*	10.0	1.72	10.0	75-125	20	80-120	20
Potassium	7722-64-7	NA*	10000.0	26.65	10000.0	75-125	20	80-120	20
Selenium	7782-49-2	NA*	10.0	4.06	10.0	75-125	20	80-120	20
Silver	7440-22-4	NA*	10.0	0.66	10.0	75-125	20	80-120	20
Sodium	7646-69-7	NA*	10000.0	243.00	10000.0	75-125	20	80-120	20
Thallium	7440-32-6	NA*	10.0	5.85	10.0	75-125	20	80-120	20
Vanadium	7440-62-2	NA*	50.0	0.70	50.0	75-125	20	80-120	20
Zinc	7440-66-6	NA*	20.0	3.04	20.0	75-125	20	80-120	20

Notes:

* No project action limits (PAL) are required. The initial investigation results will become the PALs for future investigational events.

TABLE 4-11
Reporting Limit and Control Limit Objectives for Arsenic Speciation in Water, SW846 6800
Quanta, Quality Assurance Project Plan

Analyte	PAL (ug/L)	PQL (ug/L)	Control Limits
Arsenic (III)	NA*	2.0	Laboratory limits will be used.
Arsenic (V)	NA*	2.0	

Notes:

* No project action limits (PAL) are required. The initial investigation results will become the PALs for future investigational events.

TABLE 4-12
Reporting Limit and Control Limit Objectives for Total Organic Carbon in Water, EPA 415.1
Quanta, Quality Assurance Project Plan

		Achievable Laboratory Limits				Control Limits (%)			
Analyte	CAS No.	PAL (mg/L)	PQL (mg/L)	MDL (mg/L)	QL (mg/L)	MS/MSD	RPD	LCS	DUP
Total organic carbon		NA*	1.0	0.25	1.0	75-125	20	80-120	20

Notes:

* No project action limits (PAL) are required. The initial investigation results will become the PALs for future investigational events.

TABLE 4-13
Air Methods and Parameters
Quanta, Quality Assurance Project Plan

Parameter Name	CAS No.	Method	MDL/RL	Control Limits
Antimony	7440-36-0	Modified NIOSH Method 7300 (Using AAS and AAGF)	Laboratory limits will be used. Lab has not yet been identified.	Laboratory limits will be used. Lab has not yet been identified.
Arsenic	7440-38-2			
Copper	7440-50-8			
Lead	7439-92-1			
Thallium	7440-28-0			
Vanadium	7440-62-2			
Zinc	7440-66-6			
2-Methylnaphthalene	91-57-6	TO-9 and/or Modified NIOSH 5506		
Benzo(a)anthracene	56-55-3			
Benzo(a)pyrene	50-32-8			
Benzo(b)fluoranthene	205-99-2			
Benzo(k)fluoranthene	207-08-9			
Carbazole	86-74-8			
Chrysene	218-01-9			
Dibenz(a,h)anthracene	53-70-3			
Fluoranthene	206-44-0			
Fluorene	86-73-7			
Indeno(1,2,3-cd)pyrene	193-39-5			
Naphthalene	91-20-3			
Pyrene	129-00-0			
Benzene	71-43-2	TO-15 and/or Modified NIOSH 1501		
Ethylbenzene	100-41-4			
Toluene	108-88-3			
Xylenes	1330-20-7			

SECTION 5

Calibration Procedures and Frequency

5.1 Field Calibration Procedures

Field equipment will be calibrated before the start of work and at the end of the sampling day. Any instrument drift from prior calibration will be recorded in the field notebook. Calibration will be in accordance with procedures and schedules outlined in the particular instrument's operations manual and the information included within the work plan.

Calibrated equipment will be uniquely identified by using either the manufacturer's serial number or other means. A label with the identification number and the date when the next calibration is due will be physically attached to the equipment. If this is not possible, records traceable to the equipment (for example, showing the equipment identification) will be readily available for reference. In addition, the results of calibrations and records of repairs will be recorded in the logbook.

Scheduled periodic calibration of testing equipment does not relieve field personnel of the responsibility of using properly functioning equipment. If an individual suspects an equipment malfunction, the device will be removed from service and tagged so that it is not inadvertently used, and the appropriate personnel will be notified so that a recalibration can be performed or substitute equipment can be obtained.

Equipment that fails calibration or becomes inoperable during use will be removed from service and either segregated to prevent inadvertent use or tagged to indicate it is out of calibration. Such equipment will be repaired and satisfactorily recalibrated. Equipment that cannot be repaired will be replaced.

5.2 Laboratory Calibration Procedures

Qualified personnel will appropriately calibrate laboratory instruments prior to sample analysis. The requirements specified in each method and the appropriate CLP SOW will be followed. Only certified standards of known purity may be used for calibration. Calibration will be verified at specified intervals throughout the analysis. The frequency and acceptance criteria for calibration are specified for each analytical method in Tables 4-2 through 4-13 or the appropriate CLP SOW. When multipoint calibration is specified, the concentrations of the calibration standards should bracket those expected in the samples. Samples must be diluted, if necessary, to bring analyte responses within the calibration range. The laboratory may only report those data that result from quantitation within the demonstrated working calibration range. Quantitation based on extrapolation is not acceptable. The applicable CLP SOW discusses initial and continuing calibration requirements in greater detail.

SECTION 6

Data Reduction, Validation, and Reporting

6.1 Laboratory Data Management

Data reduction will be performed manually or by using appropriate application software. Quantitation procedures specified for each method must be followed. If data reduction is performed manually, the documentation must include the formulas used. Any application software used for data reduction must have been verified previously by the laboratory for accuracy. Documentation of the software's verification must be maintained on file in the laboratory. All documentation of data reduction must allow re-creation of the calculations.

All data will undergo a minimum of three levels of review at the laboratory before release. The analyst performing the tests will initially review 100 percent of the data. After the analyst's review has been completed, 100 percent of the data will be reviewed independently by a senior analyst or by the section supervisor for accuracy; compliance with calibration, quality control requirements, and holding times; and completeness. Analyte identification and quantitation must be verified. Calibration and quality control results will be compared with the applicable control limits. Reporting limits will be reviewed to make sure they meet the project objectives. Results of multiple dilutions will be reviewed for consistency. Any discrepancies must be resolved and corrected. Laboratory qualifiers will be applied when there are nonconformances that potentially affect data usability. These qualifiers must be properly defined as part of the deliverables. All issues that are relevant to the quality of the data must be described in a case narrative. The laboratory QC Manager will review a minimum of 10 percent of data or deliverables generated for this program against the project-specific requirements. A final data review will be conducted by the Laboratory Manager or Client Service Representative to ensure that all required analyses were performed on all samples and that all documentation is complete.

6.1.1 Data Deliverables

Field XRF data, in-vitro bioavailability, and preliminary treatability testing data is screening-level but remaining analytical laboratory data will be definitive, including baseline and confirmatory testing of treatability sampling results.

The hardcopy and electronic laboratory reports for all samples and analyses will contain the information necessary to perform data evaluation. *Level 3 data packages will be provided for this project.* The data packages must conform to the regulatory format as specified in the active Professional Laboratory Services Contract and the Technical Requirements for Site Remediation, N.J.A.C. 7:26E, except for any specialty analytical services.

Following is a brief synopsis of when it is appropriate to use each deliverable:

Level 1 Appropriate for screening sample results. Noncritical project decisions are made using these data.

Level 2 Appropriate for investigative samples results that will be replaced with confirmatory data or results used for disposal purposes. Less-critical project decisions are made using these data.

Level 3 Appropriate for investigative, confirmatory, or closure results. Critical project decisions may be made using these data.

Level 4 Appropriate for investigative, confirmatory, or closure results. Critical decisions may be made using these data and will be used for projects that require a high degree of confidence in the accuracy of the data.

Hardcopy deliverables will be CLP-like forms or report formats that contain similar information. Specialty analyses will include the necessary information to perform data evaluation/data validation as required. Reporting formats similar to those specified in the latest versions of the EPA CLP SOWs for organics and inorganics analyses are preferred (EPA, 1999, 2002). The laboratory data report will be organized in a format that easily enables identification and retrieval of data. Alternate reporting formats require approval from the Project Chemist. A Level 1 report will include, at a minimum (when applicable):

- Cover letter complete with:
  - Title of report and laboratory unique report identification (Sample Delivery Group Number)
  - Project name and location
  - Name and location of laboratory and second-site or subcontracted laboratory
  - Client name and address
  - Statement of authenticity and official signature and title of person authorizing report release
- Table of contents
- Summary of samples received that correlates field sample IDs with the laboratory IDs
- Laboratory qualifier flags and definitions
- Field identification number
- Date received
- Date prepared
- Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)
- Preparation and analytical methods
- Result for each analyte (dry-weight basis for soils)
- Percent solids results for soil samples
- Dilution factor (provide both diluted and undiluted results when available)
- Sample-specific reporting limit adjusted for sample size, dilution/concentration
- Sample-specific MDL adjusted for sample size, dilution/concentration (when project objectives require reporting less than the reporting limit)
- Units

A Level 2 report will consist of all the elements contained in a Level 1 deliverable plus:

- Case narrative that describes the following information, at a minimum:

  - Sample receipt discrepancies, such as bubbles in volatile organic analysis (VOA) samples and temperature exceedances
  - All nonconformances in the sample receipt, handling, preparation, and analytical and reporting processes, and the corrective action taken in each occurrence
  - Identification and justification for sample dilution
- Surrogate percent recoveries
- MS/MSD and LCS spike concentrations, native sample results, spiked sample results, percent recoveries, and RPDs between the MS and MSD results; associated quality control limits must also be provided
- Method blank results
- Analytical batch reference number that cross-references samples to quality control sample analyses
- Executed chain of custody and sample receipt checklist

A Level 3 report will consist of all of the elements contained in Level 1 and 2 reports plus:

- Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method quality control information, such as initial and continuing calibration analyses
- Confirmation results
- Calibration blank results for inorganic analyses (required in hardcopy format only)
- ICP interference check sample true and measured concentrations and percent recoveries (required in hardcopy format only)
- Method of standard addition results (if applicable; required in hardcopy format only)
- Post-digestion spike recoveries (if applicable; required in hardcopy format only)
- Internal standard recovery and retention time information, as applicable
- Initial calibration summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)
- Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)
- Instrument tuning and mass calibration information for gas chromatography/mass spectrometry and ICP/mass spectrometry analyses
- Any other method-specific quality control sample results

A Level 4 report will include all elements outlined above for the Level 1, 2, and 3 report formats and all of the associated raw data. It is imperative that the chromatographic and other instrument data be supplied in a scale that allows review from hardcopy. Sufficient "blow-ups" of complex areas of sample chromatograms will be provided. Additional information to be supplied will include the following:

- Sample preparation logs that include the following information:
  - Preparation start and end times
  - Beginning and ending temperatures of water baths and digestion blocks
- Example calculation for obtaining numerical results from at least one sample for each matrix analyzed (provide algorithm)
- Reconstructed total ion chromatograms or selected ion current profiles for each sample (or blank) analyzed and mass spectra(s) for each compound identified, including:
  - Raw compound spectra
  - Enhanced or background spectra
  - Laboratory-generated library spectra (for tentatively identified compounds, provide the reference mass spectra(s) from software spectra library
- Ion ratio information for dioxin/furan methods

6.1.2 Hardcopy and Electronic Deliverables

From sample receipt, the laboratory will deliver within the timeframe specified in the laboratory purchase order hardcopy Level 3 reports as specified by CH2M HILL and electronic data in the format specified in Appendix B (or the most recent version of these requirements).

All electronic data files will match the final hardcopy results. CH2M HILL requires receipt of final hardcopy results in conjunction with submittal of electronic files.

All raw data will be maintained on file in the laboratory and will be available on request by CH2M HILL. Complete documentation of sample preparation and analysis and associated quality control information will be maintained in a manner that allows easy retrieval in the event that additional validation or information is required. All data generated using gas chromatography/mass spectrometry must be maintained on magnetic tapes and will be made available to CH2M HILL upon request. All documentation must be retained for a minimum of 10 years after data acquisition.

The primary responsibility for the implementation of these procedures within the laboratory will reside with the Laboratory Manager or equivalent. The Laboratory Manager will approve laboratory reports before transferring the information to CH2M HILL.

6.2 Data Validation and Verification

The analytical results of the data collection effort will be validated by CH2M HILL. In general, four levels of validation correspond to the reports described in Section 6.1. Levels 1 and 2 may be performed by the Project Chemist or other program team members. Levels 3 and 4 validation will always be performed by the Project Chemist or his/her designee.

Level 1 Verification that samples were analyzed for the methods requested and review of the data for outliers and anomalies

Level 2 Verification that samples were analyzed for the methods requested, review of the laboratory case narrative for events in the laboratory that affect the accuracy or precision of the data, review of quality control indicator data, and a “reasonableness” review of the data

Level 3 Validation of the analytical data as described below (Section 6.2.1) without review of any raw data or analyte verification

Level 4 Validation of the analytical data will be performed as described below (Section 6.2.1), including review of the analytical raw data

6.2.1 Level 2, 3, and 4 Validation Procedures

Personnel involved in data validation will be independent of any data generation effort. The Project Chemist will be responsible for overseeing data validation. Data validation will be carried out when the data packages are received from the laboratory. It will be performed on an analytical batch basis using the summary results of calibration and laboratory quality control, as well as those of the associated field samples. Data packages will be reviewed for all constituents of concern. Raw data will be reviewed for approximately 10 percent of the data packages or as deemed necessary by the Project Chemist. Validation will be performed using the following procedures and those referenced for Level 3 or 4 as appropriate:

- A review of the data set narrative to identify any issues that the lab reported in the data deliverable
- A check of sample integrity (sample collection, preservation, and holding times)
- An evaluation of basic QC measurements used to assess the accuracy, precision, and representativeness of data, including QC blanks, LCSs, MS/MSDs, surrogate recovery when applicable, and field or laboratory duplicate results
- A review of sample results, target compound lists, and detection limits to verify that project analytical requirements are met
- Initiation of corrective actions, as necessary, based on the data review findings
- Qualification of the data using appropriate qualifier flags, as necessary, to reflect data usability limitations

Level 3 validation procedures will also include reviewing the evaluation of calibration and quality control summary results against the project requirements and other method-specific QC requirements.

Data validation will be patterned after EPA (1999, 2004) guidelines for organic and inorganic data review, substituting the calibration and quality control requirements specified in this QAPP for those specified in the guidelines. The flagging criteria in Tables 6-1 and 6-2 will be used. The qualifier flags are defined in Table 6-3.

Qualifier flags, if required, will be applied to the electronic sample results. If multiple flags are required for a result, the most severe flag will be applied to the electronic result. The hierarchy of flags from the most severe to the least severe will be as follows: R, UJ, U, and J.

Any significant data quality problems will be brought to the attention of the Project Chemist.

TABLE 6-1
Flagging Conventions for Organic Methods
Quanta, Quality Assurance Project Plan

Quality Control Check	Evaluation	Flag	Samples Affected
Holding Time	**Holding time exceed for extraction or analysis by less than a factor of two**	J positive results UJ non-detects	affected samples
Holding Time	**Holding time exceed for extraction or analysis by a factor of two**	J positive results R non-detects	affected samples
Temperature	temperature exceedance >10°C if received within 24 hr	UJ non-detects	
	temperature exceedance >10C if received > 24 hr	UJ non-detects, J positive results	
Sample Preservation (volatiles)	**Sample preservation requirements not met and analyzed out of holding time**	J positive results	affected samples
	if preservation not performed in the field, but performed in the laboratory upon receipt, no flagging is required	R non-detects	
Sample Integrity (volatiles)	Professional Judgment on sample condition	J positive results/professional judgment	affected samples
	Example: Bubbles in VOA vial used for analysis	R non-detects/professional judgment	
GC/MS Instrument Performance Check	**Mass assignment in error and laboratory cannot reprocess data**	R all results	all samples in batch
	Ion abundance criteria not met	R all results if critical ions involved, use judgment otherwise	all samples in batch
Initial Calibration GC/MS Methods	**RRF <0.050 (0.010 poor performers)**	J positive results R non-detects	analyte in associated samples
	%RSD > 20% (30% poor performers) and no and no calibration curve used or linear calibration curve used and R <0.990	J positive results UJ non-detects	analyte in associated samples

TABLE 6-1
Flagging Conventions for Organic Methods
Quanta, Quality Assurance Project Plan

Quality Control Check	Evaluation	Flag	Samples Affected
	%RSD > 90%	J positive results R non-detects	analyte in associated samples
Initial Calibration GC Methods see Note 1	**%RSD >20% and no calibration curve used or linear calibration curve used and R <0.990**	J positive results UJ non-detects	analyte in associated samples
Continuing Calibration Verification **GC/MS Methods**	**RRF <0.050 (0.010 poor performers)**	J positive results R non-detects	analyte in associated samples
(ICV and CCV)	**% difference or % drift >25% (ICV) or >20% (CCV) with high recovery**	J positive results	analyte in associated samples
	% difference or % drift >25%% (ICV) or >20% (CCV) with low recovery	J positive results UJ non-detects	analyte in associated samples
Continuing Calibration Verification **GC Methods**	**% difference or % drift >15% with high recovery**	J positive results	analyte in associated samples
(ICV and CCV)	**% difference or % drift >15% with low recovery**	J positive results UJ non-detects	analyte in associated samples
Laboratory Control Sample (LCS)	**%R >UCL**	J positive results	analyte in associated samples
.	**%R <LCL but ≥10%**	J positive results UJ non-detects	analyte in associated samples
	%R <LCL but ≤10%	J positive results	analyte in associated samples

TABLE 6-1
Flagging Conventions for Organic Methods
Quanta, Quality Assurance Project Plan

Quality Control Check	Evaluation	Flag	Samples Affected
		R non-detects	
Method Blank (MB) <RL	**Convert blank to soil units if necessary, multiply highest blank value by 5 (by 10 for common lab contaminants, acetone, methylene chloride, MIBK, cyclohexane, phthalates)**	U positive results <5 x highest blank concentration (<10 x for common contaminants)	all associated samples in batch
Equipment Blank (FB) <RL	**Convert blank to soil units if necessary, multiply highest blank value by 5 (by 10 for common lab contaminants, acetone, methylene chloride, MIBK, cyclohexane, phthalates)**	U positive results <5 x highest blank concentration (<10 x for common contaminants)	all associated samples in batch
Trip Blank (TB) <RL	**Convert blank to soil units if necessary, multiply highest blank value by 5 (by 10 for common lab contaminants, acetone, methylene chloride, MIBK, cyclohexane, phthalates)**	U positive results <5 x highest blank concentration (<10 x for common contaminants)	all associated samples in batch
Matrix Spike/Matrix Spike Dup (MS/MSD) does not apply if sample result is greater than four times the spike value .	**%R >UCL**	J positive results	parent sample
	%R <LCL but >10%	J positive results UJ non-detects	parent sample
	%R <LCL but <10%	J positive results R non-detects	parent sample
-	**RPD >UCL**	J positive results	parent sample
Surrogates - SW8260	**%R >UCL**	J positive results	parent sample
	%R <LCL but >10%	J positive results UJ non-detects	parent sample

TABLE 6-1
Flagging Conventions for Organic Methods
Quanta, Quality Assurance Project Plan

Quality Control Check	Evaluation	Flag	Samples Affected
	%R <LCL but <u><</u>10%	J positive results R non-detects	parent sample
Surrogates - SW8270.	**2 or more surrogates with %R >UCL**	J positive results	parent sample
	2 or more surrogates with %R <LCL but <u>></u>10%	J positive results UJ non-detects	parent sample
	2 or more surrogates with %R <LCL but <u><</u>10%	J positive results R non-detects	parent sample
Surrogates - GC Methods	**%R >UCL**	J positive results	parent sample
	%R <LCL but <u>></u>10%	J positive results UJ non-detects	parent sample
	%R <LCL but <u><</u>10%	J positive results R non-detects	parent sample
Internal Standards -50% to +100% recovery	**Area > UCL**	J positive results	associated analytes in sample
	Area < LCL	J positive results UJ non-detects	associated analytes in sample
	Area < 25%	J positive results R non-detects	associated analytes in sample
Laboratory Duplicates <u>+</u> 25% precision	**Both sample results >5 times RL and RPD>UCL**	J positive results	laboratory duplicate pair

TABLE 6-1
Flagging Conventions for Organic Methods
Quanta, Quality Assurance Project Plan

Quality Control Check	Evaluation	Flag	Samples Affected
	One or both samples <5 times RL and a difference between results of ± 2 times RL	J positive results UJ non detects	laboratory duplicate pair
Field Duplicates ± 50% precision for soil ± 30% precision for aqueous	**Both sample results >5 times RL and RPD>UCL**	J positive results	field duplicate pair
	One or both samples <5 times RL and a difference between results of ± 2 times RL for water and ± 3.5 times RL for soil	J positive results UJ non-detects	field duplicate pair
Confirmation ± 40% precision	**RPD >40%** if lab reports higher of two results and coelution is suspected, reviewer can replace higher result with lower	J positive results	affected analytes
	Confirmation analysis not performed	J positive results	affected analytes

Initial calibration should be based on average response factors or a linear regression equation. Laboratories will need Project Chemist approval to use a nonlinear calibration curve.

TABLE 6-2
Flagging Conventions for Inorganic Methods
Quanta, Quality Assurance Project Plan

Quality Control Check	Evaluation	Flag	Samples Affected
Holding Time	**Holding time exceed for digestion or analysis**	J positive results	affected samples
cool to 4°C (except metals)	Temperature exceedance >10°C if received within 24 hr)	UJ non-detects	
metals hold 180 days	Temperature exceedance >10°C if received >24 hr)		
mercury hold 28 days	**Holding time exceed for digestion or analysis by a factor of two**	J positive results for all analytes	affected samples
		R non-detects for all analytes	
Sample preservation	**Sample preservation requirements not met**	J positive results for all analytes	affected samples
Follow guidelines in QAPP or follow USEPA	if preservation not performed in the field, but performed in the laboratory upon receipt, no flagging is required	R non-detects for all analytes	
Initial Calibration	**Correlation coefficient ≤0.995**	J positive results	analyte in associated samples
		UJ non-detects	
Initial Calibration Verification	**%R >UCL**	J+ positive results	analyte in associated samples
(ICV)			
90-110% accuracy	**%R <LCL**	J- positive results	analyte in associated samples
		UJ non-detects	
Continuing Calibration Verification	**%R >UCL**	J+ positive results	analyte in associated samples
(CCV)			
90-110% accuracy	**%R <LCL**	J- positive results	analyte in associated samples
		UJ non-detects	
Interference Check Sample	**If Interference present and %R >UCL**	J+ positive results	analyte in associated samples
metals only			

TABLE 6-2
Flagging Conventions for Inorganic Methods
Quanta, Quality Assurance Project Plan

Quality Control Check	Evaluation	Flag	Samples Affected
80-120% accuracy	**If interference is present and %R <LCL**	J- positive results	analyte in associated samples
		UJ non-detects	
Laboratory Control Sample	**%R >UCL**	J+ positive results	analyte in associated samples
(LCS)			
75-125% accuracy	**%R <LCL but ≥30%**	J- positive results	analyte in associated samples
		UJ non-detects	
	%R <LCL but ≤30%	J- positive results	analyte in associated samples
		R non-detects	
Calibration Blank	**Convert blank to soil units if necessary, multiply**	U positive results < 5 x highest	all associated samples in batch
(ICB or CCB)	**highest blank value by 5**	blank concentration	
<RL			
	If negative blank and absolute value is greater than	J- positive results	analyte in associated samples
	the MDL and negative value is >25% of sample	UJ non-detects	
	Result		
Method Blank	**Convert blank to soil units if necessary, multiply**	U positive results < 5 x highest	all associated samples in batch
(MB or PB if prep blank)	**highest blank value by 5**	blank concentration	
<RL			
	If negative blank and absolute value is greater than	J- positive results	analyte in associated samples
	the MDL and negative value is >25% of sample	UJ non-detects	
	Result		

TABLE 6-2
Flagging Conventions for Inorganic Methods
Quanta, Quality Assurance Project Plan

Quality Control Check	Evaluation	Flag	Samples Affected
Equipment Blank	**Professional Judgment on application**	U positive results < 5 x highest	all associated samples in batch
(FB)	**Convert blank to soil units if necessary, multiply**	blank concentration	
<RL	**highest blank value by 5**		
Matrix Spike/Matrix Spike Dup	**%R >UCL**	J+ positive results	parent sample
(MS/MSD)			
does not apply if sample result is greater	**%R <LCL but ≥30%**	J- positive results	parent sample
than four times the spike value		UJ non-detects	
	%R <LCL but ≤30%	J- positive results	parent sample
75-125% accuracy		R non-detects	
± 25% precision	**RPD >UCL**	J positive results	parent sample
Dilution Test	**If concentration is >50 times the MDL and %**	J positive results	all samples from same site as
metals only	**difference is >UCL**		parent sample
± 30% precision			
Post-Digestion Spike	**%R >UCL**	J+ positive results	all samples in digestion batch
metals only			
perform if dilution test fails	**%R <LCL but ≥30%**	J- positive results	all samples in digestion batch
75-125% accuracy		UJ non-detects	
	%R <LCL but ≤30%	J- positive results	all samples in digestion batch
		R non-detects	

TABLE 6-2
Flagging Conventions for Inorganic Methods
Quanta, Quality Assurance Project Plan

Quality Control Check	Evaluation	Flag	Samples Affected
Method of Standard Additions	**R <0.995**	J positive results	analyte in sample
metals only			
perform if post-digestion spike fails			
Laboratory Duplicates	**Both sample results >5 times RL and RPD>UCL**	J positive results	laboratory duplicate pair
± 25% precision			
	One or both samples <5 times RL and a difference	J positive results	laboratory duplicate pair
	between results of ± 2 times RL	UJ non-detects	
Field Duplicates	**Both sample results >5 times RL and RPD>UCL**	J positive results	field duplicate pair
± 50% precision for solids			
± 30% precision for aqueous	**One or both samples <5 times RL and a difference**	J positive results	field duplicate pair
	between results of ± 2 times RL for water and	UJ non-detects	
	± 3.5 times RL for soil		

.

TABLE 6-3
Qualifier Flag Definitions
Quanta, Quality Assurance Project Plan

Flag	Definition
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.
U	This analyte was analyzed for but not detected at the specified detection limit.
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
NJ	The analysis indicates the presence of an analyte that has been “tentatively identified” and the associated numerical value represents its approximate concentration.

SECTION 7

Performance Evaluations

To assess sample and data collection procedures, performance evaluations will be conducted and will consist of technical systems audits and performance audits.

7.1 Technical Systems Audits

7.1.1 Laboratory Audits

The laboratories participating in the data collection effort will have been prequalified by Honeywell and the project team. Honeywell maintains a surveillance audit program that requires technical systems audits to be performed on a defined basis. Laboratory prequalification and the surveillance audits may also be undertaken by the regulatory agencies. Laboratory prequalification audits may be performed as either onsite audits, desk audits, or a combination of both.

7.1.2 Field Audits

Field audits will be performed once a year to verify the proper execution of field procedures. Procedures to be evaluated include the following:

- Sample containers and preservatives handling
- Sample collection and identification procedures
- Sample custody, handling, and shipping procedures
- Equipment decontamination procedures
- Calibration of field instruments and performance of field tests
- Documentation of field activities, maintenance of field records, and document control

7.2 Performance Audits

7.2.1 Performance Evaluations

Laboratories are required to participate in a performance evaluation program. Any method or analyte failure in a performance evaluation program that affects the certification status of the laboratory with the National Environmental Laboratory Accreditation Program or the State of New Jersey must be immediately communicated to the Program Chemist.

7.2.2 External Audits

Announced and unannounced audits of the field operations and of the laboratories may be conducted during any stage of the project.

7.2.3 Internal Audits

Annual audits of the laboratory will be conducted by the laboratory’s QA Officer. The audits will verify, at a minimum, that written SOPs are being followed; standards are traceable to certified sources; documentation is complete; data review is being performed effectively and is properly documented; and data reporting, including electronic and manual data transfer, is accurate and complete. All audit findings will be documented in quality assurance reports to laboratory management. Necessary corrective actions will be taken within a reasonable timeframe. The QA Officer will verify that such actions are effective and complete, and will document their implementation in an audit closeout report to laboratory management.

SECTION 8

Preventive Maintenance

The primary objective of a preventive maintenance program is to promote the timely and effective completion of a measurement effort. The maintenance program will be designed to minimize the downtime of crucial sampling or analytical equipment from expected or unexpected component failure. In implementing this program, efforts will be focused on establishing the following:

- Maintenance responsibilities
- Maintenance schedules for major or critical instrumentation and apparatus
- Adequate inventory of critical spare parts and equipment

8.1 Maintenance Responsibilities

Laboratory instrument maintenance is the responsibility of the participating laboratory. Generally, the laboratory manager or supervisor is responsible for the instruments in his or her work area. This person responsible will establish maintenance procedures and schedules for each instrument.

Maintenance responsibilities for field equipment are assigned to the Field Team Leader for specific sampling tasks. However, the field team using the equipment is responsible for checking the status of the equipment before using it and reporting any problems encountered. The field team is also responsible for ensuring that critical spare parts are included as part of the field equipment checklist. Nonoperational field equipment will be removed from service, and a replacement will be obtained. All field instruments will be properly protected against inclement weather during the field investigation.

8.2 Maintenance Schedules

The effectiveness of any maintenance program depends, to a large extent, on adherence to specific maintenance schedules for each piece of equipment. Other maintenance activities are conducted as needed. Manufacturers' recommendations should provide the primary basis for establishing maintenance schedules. Manufacturers' service contracts may be used for implementing scheduled maintenance.

An instrument logbook will be assigned for each analytical instrument. All maintenance activities will be documented in this logbook. For each instrument, the logbook should contain to following information:

- Date of service
- Person performing service
- Type of service performed and reason for service
- Replacement parts installed (if appropriate)
- Date of next scheduled service
- Any other useful information

8.3 Spare Parts

In addition to a schedule for maintenance activities, an adequate inventory of spare parts is required to minimize equipment down time. The inventory should include parts and supplies that are subject to frequent failure, have limited useful lifetimes, and cannot be obtained in a timely manner should failure occur.

Field managers and the respective laboratory managers are responsible for maintaining an adequate inventory of spare parts. In addition to spare parts and supply inventories, an in-house source of backup equipment and instrumentation will be available.

SECTION 9

Data Assessment

All data generated for this project will be evaluated according to the QA acceptance criteria specified by the analytical methods and National Functional Guidelines. Limitations on data usability will be assigned, if appropriate, as a result of the validation process described in Section 6.

SECTION 10

Corrective Action

Corrective action may be required as a result of deviations from field or analytical procedures. Deficiencies identified in audits and data quality evaluations may also call for corrective action. All project personnel have the responsibility, as part of their normal work duties, to identify, report, and solicit approval of corrective actions for conditions adverse to data quality.

Field and laboratory staff may encounter conditions requiring immediate corrective action that are not covered in the work plan or QAPP. These personnel will document conditions and the results of corrective actions in a field logbook or laboratory nonconformance report and communicate their actions as soon as feasible to the Field Team Leader, Laboratory Supervisor, and if necessary, the Project Chemist for immediate input. A mechanism must be established to allow for supervisory review or Honeywell input for any deviation or deficiency. A corrective action reporting system that requires immediate documentation of deviations or deficiencies and for supervisory review of the actions taken to correct them will be established. At a minimum, the corrective action report should include the following:

- Type of deviation or deficiency
- Date of occurrence
- Impact of the deviation or deficiency, such as samples affected
- Corrective action taken
- Documentation that the process has been returned to control

The only time that a corrective action report may be waived is when a deviation or deficiency is immediately corrected and its impact is precluded. An example would be an unacceptable initial calibration that is correctly calibrated before samples are analyzed.

Each corrective action report must be reviewed and approved by a person of authority, such as the Field Team Leader or Laboratory Supervisor. The person ultimately responsibility for the laboratory corrective action process is the QC Manager, who must ensure that proper documentation, approval, and closeout of all out-of-control or nonconformance events is performed. A nonconformance report will summarize each nonconformance condition. Corrective action reports that potentially affect data quality must be brought to the attention of the Project Chemist. Report disposition will be the responsibility of the Project Chemist. The Project Manager may be notified about a particular report at the Project Chemist's discretion. Copies of corrective action reports must be maintained in the laboratory or field project files.

SECTION 11

Quality Assurance Management

A QA report will be submitted by the Project Chemist to the Project Manager at the end of each sampling interval. The report will summarize the results of the data validation and the data assessment. The results will be presented in a manner that enables decision making. For example, temporal data may be more effectively presented if supplemented by a time plot. Any significant quality problems and recommended solutions will be included in the report. Limitations on data usability that were identified during data validation will be highlighted. The results of data assessment will be reconciled with the project objectives.

SECTION 12

Data Management

The electronic data will be used to generate validation reports, risk assessment calculations, modeling results, data summary tables, and maps and other figures. This program will follow CH2M HILL standard procedures for environmental data collection. A site-specific data management plan will be developed before starting field work. This plan will outline the policies, procedures, and protocols to be followed to handle the environmental data generated. These protocols give data users simple procedures to rapidly access stored data; ensure consistency among all field activities; provide methods of data entry with known accuracy and efficiency; apply well-documented validation procedures to an electronic database; manage sample data using unique sample identification numbers; establish a sample inventory of new data collected and provide methods of sample inventory reconciliation; store and provide sample-specific attributes, including location identifiers, sample type and media, and sample date; and provide reporting and delivery formats to support data analysis and reduction.

12.1 Archiving

Hardcopy and electronic versions will be archived in project files and on electronic archive tapes for the duration of the project, 5 years, or as specified in contractual agreements.

12.2 Data Flow and Transfer

The data flow from the laboratory and field to the project staff and data users will be sufficiently documented to ensure that data are properly tracked, reviewed, and validated before use.

12.3 Record Keeping

In addition to the data management procedures outlined in Section 6.1 for analytical data, the laboratory will ensure that electronic and hardcopy records sufficient to recreate each analytical event are maintained. The minimum records the laboratory will keep will contain the following:

- Raw data, including instrument printouts, bench worksheets, and chromatograms with compound identification and quantitation reports
- Laboratory-specific written SOPs for each analytical method and QA/QC function in place at the time of analysis of project samples

SECTION 13

Project Roles and Organization

The Honeywell Remediation Manager has the overall responsibility for this project and will ensure that the requirements of the contract are attained in a manner consistent with the Consent Decree and the ROD. The Honeywell Remediation Manager and the CH2M HILL Project Manager will coordinate with responsible parties to ensure that the executed work is completed in a manner that is consistent with the performance criteria and the procedures set forth within this QAPP and other project documents. The below table indicates key leadership personnel involved and responsibilities.

TABLE 13-1
Project Roles and Organization
Quanta, Quality Assurance Project Plan

Name	Title	Organizational Affiliation	Responsibilities
Richard Ho	Region 2 Remediation Project Manager	USEPA	The Remediation PM is responsible for review and approval of documents for all phases of the remedial design (RD) and remedial action (RA).
Erica Bergman	Region 2 Remediation Project Manager	NJDEP	The NJDEP PM has the responsibility to review site documents for consistency with NJ requirements for CERCLA sites within the state, and provide timely comments to EPA upon request by the lead agency.
Steve Coladonato	Remediation Manager	Honeywell	The Honeywell Remediation Manager will be responsible for coordinating overall site objectives and project review. Responsibilities include developing and implementing the project and financial and contract management.
Steve Zarlinski	CH2M HILL PM	CH2M HILL	The PM has responsibility for communication with the RM and external stakeholders, overall project performance (financial, schedule, staffing), conflict resolution, change management, and external stakeholder interaction. The PM is responsible for reporting project changes to the rest of the team as appropriate to maintain a common understanding of the project vision and scope.
Peter Deming	MRCE PM	MRCE	MRCE is responsible for performing the necessary work and evaluation required to determine appropriate geotechnical investigations needed for the remedial action.
Tom Carlson	Emilcott PM	Emilcott	Emilcott is responsible for designing and implementing the air monitoring component of the predesign investigation.
Mark Neilson	Environ PM	Environ	Environ is responsible for consulting with the project team during components related to the shoreline and SRB design.
Dan Martoccia	Parsons PM	Parsons	Parsons is responsible for design and implementation of bench-scale treatability testing for the high concentration arsenic area (HCAA) stabilization portion of the remedial design.
Keli McKenna	Design Task Lead	CH2M HILL	The Design Task Lead is responsible for creating a cohesive document that encompasses all parts of the

TABLE 13-1
Project Roles and Organization
Quanta, Quality Assurance Project Plan

Name	Title	Organizational Affiliation	Responsibilities
			remedial design field work and implements a design for the remedial action. The Design Task Lead will be responsible for coordination of the writing of the Basis of Design, RD Report, and RAWP with all authors involved in the writing.
Marty Reif	NJ Professional Engineer	CH2M HILL	The NJ PE is responsible for overseeing the development and quality of remedial design drawings and certifying documents as appropriate.
Kevin Flynn	Remedial Construction Task Lead	CH2M HILL	The Construction Manager is responsible for technical, personnel, construction methodology, quality, safety, and project owner interface details of the project and the project team while mobilized to the project site. The Construction Manager will manage site activities to be performed, lead the project team so that work is completed efficiently and correctly, and control the use of resources to meet project objectives.
Mike Murphy	Field Manager	CH2M HILL	The Field Manager is responsible for coordination of all field activities as described within the RDWP and includes including subcontractor oversight. The Field Manager will document field work performed, and maintains updated work plans and the Health and Safety Plans (HSP) for the work to be performed.
Bill Berlett	Health and Safety Manager	CH2M HILL	The site Health and Safety Manager is responsible for reviewing and editing the site HASP, which will be included in the work plan. The Project Manager coordinates involvement during construction to ensure compliance is achievable. The site Health and Safety Manager conducts health and safety audits during the project to ensure the HASP is supported by the project team. The site Health and Safety Manager will select an onsite representative to be responsible for day-to-day health and safety activities.
Amy Klopper	Project Chemist	Critigen	Main point of contact with laboratories, responsible for timely and correct delivery of lab scope of work, including hard copy and electronic deliverables. Works with the Subcontracts Administrator to contract the lab, including providing a detailed outline of the expectations of the lab including all deliverables in the form of a contractually binding laboratory scope of work, including penalties for non-performance. Coordinates with laboratories and the Field Operations Lead to facilitate data handling, receipt, and validation. Handling day to day issues that arise at the lab during a sampling event. Coordinates with the Data Management Lead to upload validated data to Locus, and maintain the Data Tracking Sheet on in the project folder. Maintain and update QAPPs as necessary.

SECTION 14
References

EPA. 1995. Good Laboratory Practices in Principles and Guidance to Regulations for Ensuring Data Integrity in Automated Laboratory Operations.

EPA. 1996. Test Methods for Evaluating Solid Waste, Physical and Chemical Methods. *SW-846.* 3rd Edition, Update III, Section 1.

EPA. 2008. USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review. *EPA-540-R-08-01.*June.

EPA. 2000. Guidance for the Data Quality Objectives Process. *EPA QA/G-4*. August.

EPA. 2001, reissued 2006. Requirements for Quality Assurance Project Plans. *EPA QA/R 5*. March.

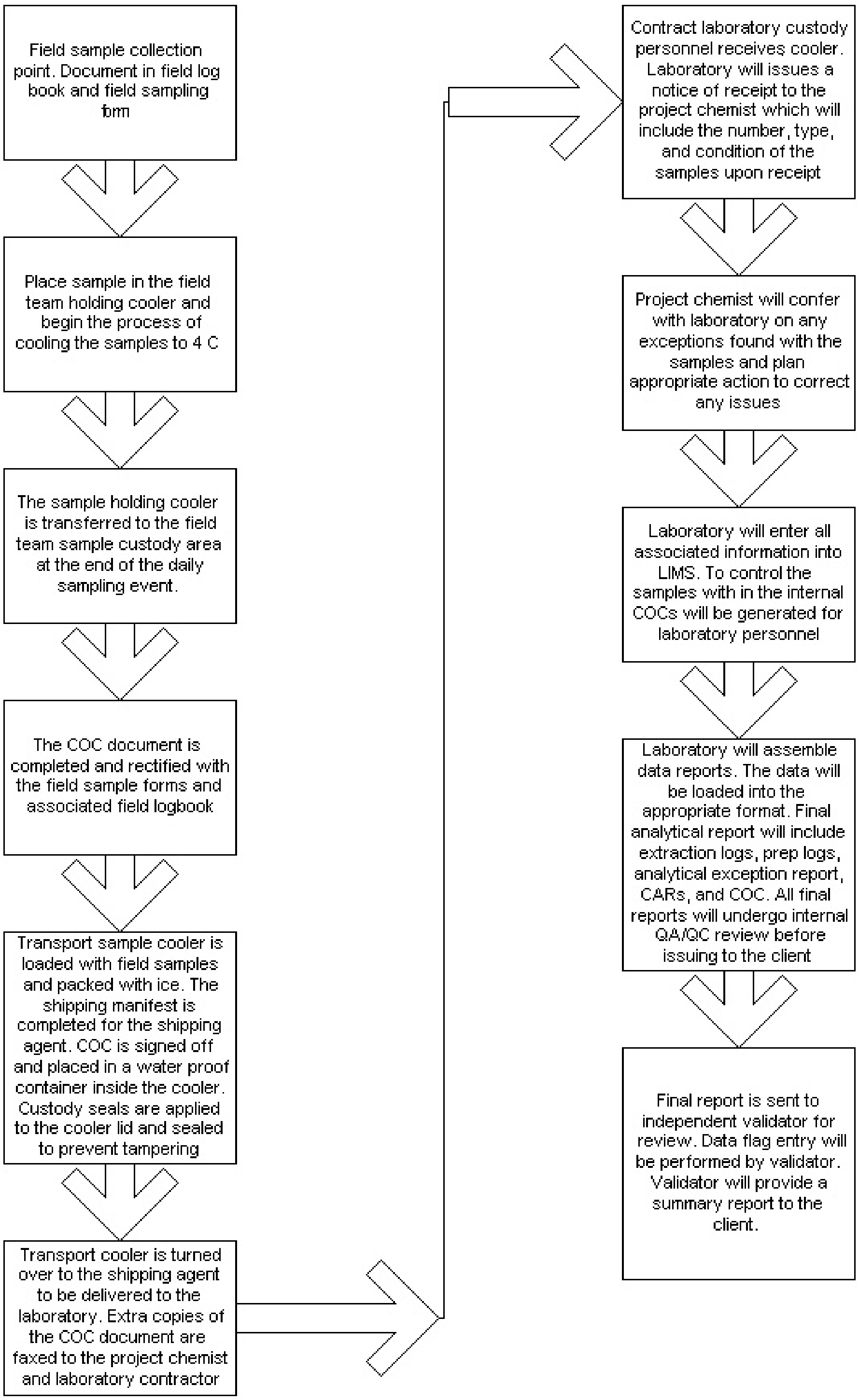
EPA. 2010. USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review. EPA 540-R-10-011. January.

EPA Reg II. 2008. Validating Volatile Organic Compounds by SW-846 Method 8260B. *SOP HW-24, Rev 2.* August.

EPA Reg II. 2008. Validating Semivolatile Organic Compounds by SW-846 Method 8270. *SOP HW-22, Rev 4.* August.

Appendix A
Sample Handling

Sample handling diagram



Appendix B
AESI EDD Requirements

Analytical and Environmental Services, Inc. 503 Oakdale Avenue Glencoe, Illinois 60022
e-mail: renesurgi@aol.com
847.835.0983 facsimile 847.835.9404

Date: April 5, 2006

To: Honeywell Analytical Laboratory Partners

From: Rene Surgi

CC: Chris French

RE: Honeywell EDD Specifications

I. Introduction

As many of you may know, Honeywell adopted its original standard Electronic Data Deliverable (EDD) format for use with Locus Technologies' (www.locustec.com) EIM™ environmental data management system on August 31, 2003. Honeywell selected this standardized approach to increase process efficiencies and reduce overall data management costs. The standard EDD will allow Honeywell to:

- Standardize electronic data validation and reduce the cost excepting selected aspects of all but the highest levels of validation (i.e., level 4);
- View the data immediately after upload to EIM™;
- Locate data with simple queries rather than having to sort through voluminous hardcopies;
- Locate past experiences and results to extrapolate to future project planning.

Honeywell is replacing this original 42-field EDD (EIM) with EIM53 that has 11 additional key fields. For laboratories submitting electronic data to California, and following the Geotracker EDF format, there will be a separate EDD called EIMEDF. EIMEDF is required for CA submissions only. A summary is provided below.

TABLE 1
Summary of Honeywell Database Formats

Format	# Fields	Effective Date
EIM	42	Current. Replaced by EIM53 by May 15, 2006.
EIM53	53	Effective on May 15, 2006.
EIMEDF	64	Effective on May 15, 2006. Required for CA submissions only.

For the Honeywell standard EDD process to work effectively, it is essential to enter unambiguous information in the Honeywell EDDs, which will be uploaded to EIM™. This memo specifies the laboratory and consultant responsibilities to provide correct and timely uploads to EIM. To this end we are providing rigorously defined data fields, format, content and required QC. These instructions are designed to eliminate problems associated with EDD production, eliminate errors in the data and upload process, and ensure seamless operations for future data handling.

The following sections:

- Outline Honeywell's requirements for the Honeywell Standard EDD;
- Provide a method for laboratories to self-test EDDs for acceptability; and
- Include a laboratory certification of ability to comply with the requirements set forth herein.

For your convenience, all of the referenced tables are presented at the end of the document. Electronic data files are also included with this distribution to aid in adapting to laboratory LIMs systems. Generally, there are a maximum of 64 fields – up from the 42 fields for the previous EDD. You will also see shaded fields (#54 - #64). These fields are required, as indicated, only for those labs that are required to produce the CA Geotracker EDF. If you are producing a report for submission to CA, this EDF is a requirement. Both your Geotracker EDF and your Honeywell EIM EDD requirements will be satisfied by the production of this single EDD. Two EDDs will no longer be required. Information and pertinent locations of critical valid values are summarized in Table 2 below.

TABLE 2
Summary of Valid Value Files and Locations

Description	Status (Locked/ Supervised)	Location (on EIM Server)	File Name (attached hereto and on EIM Server) THIS FILE HAS FIVE SHEETS	EIM Fields Affected (Field Number and Field Name)
CAS #	Locked	Any site specific data base to which lab has access.	LabID_Methods_Parameter Codes 02-24-06 1213.xls	#5 [PARAMETER_CODE]
Parameter names & codes (parameters without CAS#s)	Supervised	Any site specific data base to which lab has access.	LabID_Methods_Parameter Codes 02-24-06 1213.xls	#5 [PARAMETER_CODE]
Laboratory IDs	Locked	Any site specific data base to which lab has access	LabID_Methods_Parameter Codes 02-24-06 1213.xls	#2 [LAB_ID]
Method codes	Locked	Any site specific data base to which lab has access	LabID_Methods_Parameter Codes 02-24-06 1213.xls	#3 [ANALYTICAL_METHOD]

Locked means that no deviation will be acceptable – the EIM Data Checker will give an error, the lab will be unable to upload and the lab must make the repair. The lab is ultimately responsible for updating all associated reports (i.e. particularly the hardcopy). Supervised means that an alternative may be used ONLY IF THERE IS NOT A VALID VALUE already listed. The data management team will tentatively review laboratory submitted valid values. AESI will review laboratory submissions from labs/data managers prior to final upload to EIM and accept or reject laboratory proposals. The timing of AESI review will not affect your turnaround time calculations as regards deliverables.

The general changes from the previous EDD can be summarized as follows.

a) Fields #1 - #45, #53: Generally similar with some minor changes over last edition;

b) Fields #46 - #50: TAT, confirmation of rush charges, on-time delivery metrics;

c) Fields #51 - #52: Tracks subcontracting laboratories;

d) Fields #54 - #64: CA Geotracker EDF fields (labs submitting CA packages only).

II. Honeywell EDD Requirements

A. Implementation Date

All laboratories providing data to Honeywell will be required to submit analytical results in the Honeywell EDD format as indicated in Table 1 beginning May 15, 2006. There are no exceptions to the laboratories' requirements to provide EIM Electronic Data Deliverable, unless written authorization is provided by Honeywell.

B. Required QC

All EDDs are required to contain the applicable QC that are necessary for EIM™ to validate the electronic dataset. Table 4 contains the list of QC valid values that EIM™ uses to validate uploaded analytical data files. Table 3 contains the list of required fields that are to be included in Honeywell EDDs. The shaded fields are only required for those labs submitting data subject to the Geotracker EDD format requirements.

Honeywell requires analytical laboratories to report any QC parameter in hardcopy that is reported electronically although the hardcopy may contain QC parameters that are not reported electronically (i.e. calibration and tuning information). For those common fields, the hardcopy QC and hardcopy analytical result must be identical with the EDD in every respect for all deliverables.

Data are to be batched for analytical preparation in groups of, at most, 20 field samples. Honeywell is requiring the laboratory to have, at a minimum, all project-required QC for every batch – even if the batch consists of one sample.

The Honeywell Laboratory Services Contract requires analyses of a Honeywell specific MS/MSD at no additional charge to Honeywell if the batch contains at least 10 Honeywell samples. If there is insufficient sample, a batch MS/MSD must be reported to Honeywell – at no additional charge. "Batch QC" means the QC that was part of the same digestion batch, digested at the same time as the samples to which it is applicable and not a QC sample prepared on a different day or as part of a different digestion batch. If your LIMS limitations prevent your lab from reporting batch QC (i.e. non Honeywell samples as MS/MSD) with the Honeywell EDD, you must use a Honeywell specific MS/MSD at no additional charge to Honeywell.

C. EDD Format Requirements

To facilitate data loading, the following electronic file formats must be observed:

- The file format must be ASCII with no header or footer, and with each record alike with respect to format.
- Every analytical result is to be a single record.
- No field will be enclosed in quotation marks.
- Every field must be separated by a semi-colon (a comma must not be used – owing to its frequent appearance in chemical names).
- Each record must be terminated with a carriage return (except the last record).

D. Example Acceptable ASCII Files

The example below shows an excerpt from an acceptable ASCII file in semicolon-delimited form. Note that this example has 64 fields – each separated by the semicolon - that directly corresponds to those fields identified in Table 3. Note also that Fields #54 - #64 are unique to labs submitting packages in accordance with CA

1298901;CTBERK;SW8260;11/11/2005;67-64-1;TRG;10;ug/l;10;WATER;161723-001;22:37;U;;1;SW5030;11/10/2005;76742;2.5; g;wet;161723;QC195469;;Acetone;INIT;N;N;;;;;;;2;;REG;;;;;;;;;11/9/2005;10:25;11/25/2005;N;11/28/2005;;;WET;;;;161732;N;PR;CS1;PQL;;;NA <carriage return>

Shaded fields (#54 - #64) are Geotracker requirements (CA only).

Geotracker requirements. Also note that there is no semicolon after the 64th field as the record is ended with a carriage return. This represents one record or one sample from the ASCII file (EIM_Example_EDD64.txt) supplied along with this memo. Note that fields #53 and #64 are required fields.

In instances where a CAS number does not exist, Honeywell has defined the nomenclature that must be used. Those definitions are attached to this memo in Excel file named "Lab ID_Method_Parameter Codes 02-24-06 1213.xls". In the future, this file will be available for downloading from the Locus web site and can be distinguished by its time (1213) and date (02-24-06) stamps. The remaining parameters should have CAS numbers. It is the laboratory's responsibility to supply the correct CAS number.

E. Handling of Historical Data

Some portion of the EDDs requested by Honeywell will be termed "historical" indicating that these analyses have already been completed by the laboratory. For laboratories where historical data are being requested, Honeywell will provide a specific memo with instructions on how this exercise will be handled, as we understand that historical data may involve a reasonable amount of repair.

F. Handling of Future Data

Samples submitted and EDDs delivered after the date of this EIM™ EDD implementation will require this nomenclature and data format. Honeywell requires laboratories produce

EDDs that are consistent and error-free and must be uploaded to the site specific holding table, by the lab on or before the due date. Failure to upload and error-free EIM EDD by the due date may result in penalties as specified in your Master-Service Agreement with Honeywell. The process is described below for labs uploading the EIM EDD to the holding table for the site specific database, obtaining and error report and sending an email indicating such to the parties as stipulated below.

G. Common EDD Errors to Avoid and the Role of the Consultant

There are some data that the laboratory will have and some data that the consultant will have. The laboratory will, for example have the results, method names and QC, while the consultant will have the field data such as location ID and field sampling point. The instrument to link these important sets of information is the chain of custody (COC). The COC will provide the link between the sample ID and the lab ID – as it does now. There are two electronic COC possibilities: a) the Sample Planning Module in Locus EIM and b) the E-COC (maintained by AESI). Both provide electronic COCs with standard fields (for field information) that can be uploaded to EIM electronically. The E-COC outputs a text and an Excel file that can be used for electronic log-in by the laboratory, saving time associated with manual log-in and subsequent correction of transcription errors.

When entering data, it is important to remain consistent. The most common requirements that are often overlooked in the assembly of the EDD ASCII file are:

1 First row header problems - There should be no header in the first row.

2 Use of quotes - Do not use quotes (this sometimes occurs if the EDD is produced from an Access data base).

3 Using comma as a delimiter - Do not use a comma delimiter – a semicolon is required.

4 Improper reporting of a non-detect - If the analytical result is non-detect (ND) at the laboratory MDL – put the laboratory reporting limit in this field – Field #7. If the result is between the MDL and the RL, report the result and use a "J" flag (EIM Field #13).

   a) A "U" (EIM Field #13) is used for results below the MDL and a "J" (EIM Field #13) for results between the MDL and RL (with the actual result entered into EIM Field #7).

   b) If the result is below the MDL, the RL goes into EIM Field #7, even though we estimate to the MDL.

   c) Note that Fields #7 (RESULT), #13 (QUALIFIER), #9 (REPORTING LIMIT) and #35 (METHOD DETECTION LIMIT) work together.

   d) In some cases, labs may be required to report only to the RL and not the MDL so a result under the RL, but above the MDL would be destined as "U" instead of a "J" (EIM Field #13) in these cases.

5 Inconsistent valid values - Honeywell has established a list of required valid values for both data qualifiers and analyte names (in cases where no CAS number exists). These valid values are provided in an Excel file (Lab ID_Method_Parameter Codes 02-24-06 1213.xls) that accompanies this memo and can be filtered. From time to time, these valid values will require updates. The updates will be posted in EIM and will be accessible through your EIM Data Checker window using your lab name and password.

6 Usually these valid value updates provide new values and rarely, if ever, will affect previous valid values. The file name will contain the time and date stamp, following the structure of the name above.

7 The EIM field #1: FIELD_SAMPLE_ID – The consultant, not the lab, must independently complete this prior to the EDD being checked/uploaded by the lab. This is one of the first things a consultant must do to preserve the efficiency of using the EIM database. If not done in this sequence, errors will be significant and numerous. Since this is the responsibility of the consultant, it will not be counted against the laboratory EDD. It is our intent to remove from the Laboratory EIM Error Summary those errors not attributable to the lab.

8 Combining qualifiers and other valid values. Do not combine valid values. Unless the combination is explicit in EIM – the combination will generate an error message "Entry not in the list of valid values". One example is the combination of "J" and "B". We have added "BJ" explicitly as a valid value. If you were to combine these to form "BJ", without this explicit addition to EIM, you would receive the error message concerning the valid value entry not in the list. If a valid value is not on the list and you feel you require it, discuss it with your data managers. If the problem persists, or no valid value can be located, contact Rene Surgi (847-835-0983 or renesurgi@aol.com) so it can be added.

9 Dissolved analytes. When analyzing for dissolved and/or total analytes, please include the adjective "dissolved" in the parameter name (EIM Field #25); (i.e. Iron, dissolved; use the proper CAS # for iron) and BE CERTAIN THAT THE FILTERED FLAG (EIM Field # 27) IS SET TO "Y".

10 Volatile analytes. There are two instances in which volatile analytes are at issue: a) the measurement of volumetric analytes (i.e. those analytes whose concentrations are measured in volumetric units (ug/m^3)) and b) those analytes measured as part of a method known as AVS-SEM (acid volatile sulfides-simultaneously extractable metals). In both of these cases, add a "V" to the CAS# or pseudoCAS # in Parameter Code (EIM Field #5). For example iron, analyzed ancillary to the AVS-SEM, protocol would post a CAS # of 7439-89-6V and benzene analyzed by an EPA TO method would post a CAS# of 71-43-2V.

H. Valid Values

As indicated above, Honeywell has identified a set of standard valid values for laboratories to follow. These include use of CAS numbers when they exist; use of Honeywell defined valid values when CAS numbers do not exist, method codes and a list of standard data qualifiers. All of these valid values are included with this memo and the current list can be found in EIM [Locus > Reference > EIM Reference > Client Specific SOPs > LabID_Methods_ParameterCodes 02-24-06 1213.xls] Remember, updates (designated by the date (02-24-06 and time stamp (1213)) will add new valid values and rarely change the previous ones. Honeywell may be adding Laboratory Qualifiers from time to time to make for a more comprehensive validation and to make the EDD more acceptable to regulatory agencies. Honeywell will not actively communicate these changes to the laboratories and consultants as they are developed, but they will be reviewed monthly and the updates posted on EIM. They will be accessible simultaneously to all the labs through their respective EIM Data Checker windows. Valid values are of two types: locked and supervised.

- Locked means that deviations cannot be uploaded – the lab will get an error message in instances where deviations are used.
- Supervised means labs may select alternates as long as a suitable valid value does not exist in the current valid value list.

The current valid value list must be consulted first, prior to using a valid value not in the current list. Selection of new valid values alternatives is to be only an occasional happenstance and does not take the place of judicious searching for suitable valid values. If the adaptation of a valid value is in question contact your data managers. AESI (847-835-0983; renesurgi@aol.com) can provide clarification of any new valid value(s) should the need arise. The consultant may correct only nominal errors – those errors defined as requiring less than an hour to repair and as noted above, will be done in EIM. If the consultant makes any repairs, he will return a copy of the repaired EDD so the lab can take corrective action to prevent any recurrence. Excessive consultant time expended in such EIM EDD repair of laboratory errors will be reviewed by AESI and may be charged back to the labs in a manner consistent with your MSA. Consultant related errors will not be counted against the lab.

Table 2 lists specifically which fields are the responsibility of the consultant and which fields are the responsibility of the laboratory. In such cases, the consultant or AESI may be contacted for assistance and to provide missing data, but it is the responsibility of the laboratory to successfully deliver an error-free EDD, on time, as measured by the EIM data checker. The laboratory's time stamp for the delivery of an error free EDD is the date of the autonotify memo (discussed herein) from EIM, which is consistent with the time stamp denoting the last upload of the EDD in question.

I. Managing TICs in EIM

TICS are tentatively identified compounds. These are compounds detected in samples that are not target compounds, internal standards or surrogate standards. Up to a specified number of peaks are subjected to mass spectral library searches for tentative identification. The assigned identity may be inaccurate, as well as any quantitation. The number of TICs reported at a site is typically determined by regulatory requirements. TICs are stored in EIM with a unique identification. Result Type will be labeled TIC and the parameter code will be TIC. The parameter name will be reported by the laboratory – uniqueness is established by using the parameter name and retention time for the result. TICs can be filtered in output results when performing chemistry queries or when creating custom queries.

- RET_TIME must be populated in EDD for all TICS.
- RES_TYPE must be "TIC" to differentiate from other data records.
- Parameter_Code will be labeled "TIC". The individual records will be unique because the Retention time reported on the EDD will keep records unique.
- Parameter Name must be populated by the analytical laboratory so that EIM knows what compounds were identified. These will not match the valid values in Locus EIM as TICs are not included in the list of valid values. Contact the project analytical laboratory prior to sampling to ensure the lab can produce an EDD with the TIC identification requirements identified above.

III. EDD Self-Test and Data Upload Process

A. Revised EDD Upload Process

To facilitate compliance with the requirements outlined in this memo, Honeywell has established a NEW process for laboratories to test and upload an error free EDD to EIM™. The process is described below and differs from previous processes in that the labs will upload directly to a site specific database. Appendix A contains screen shots that show the process and its location within Locus.

1 The labs will be uploading to a holding table and that upload will be to a site specific database. Locus will provide the needed access to the Honeywell site. If you experience problems in accessing your site, call or email Rene Surgi and the Locus EIM Help Desk (EIMHelp@Locustec.com).

2 As in the past, the labs must review the Error Report, but now it will be site specific. Locus will add one additional column to the site-specific error report to the labs. This column will tell the user if the error is attributable to the lab or to the consultant and there will be less errors we now classify as ambiguous (i.e. "Method not in list of valid values" which can be due either to the lab typographical error or the consultant not assigning the Method to the lab/site.) A site specific data base should have these assignments already in place. If there are any questions, contact your site manager to ensure your site is established in EIM.

3 Rather than using a generic data checker for the Honeywell EIM EDD, you will be uploading to a specific site. By using the site-specific EIM Data Checker, you will be uploading your EIM EDD into the holding table, from which a site-specific error report will be generated. The lab should continue the process of correcting errors and using the Data Checker (using the tab

"UPLOAD DATA SET") until no errors are listed in the error report. Once there are no errors listed in the error report, your delivery of an error free EDD is complete. If during this process, you encounter errors you believe are attributable to the consultant, contact them to discuss the error report.

1 Closure by the labs is evidenced by EIM Autonotify: this is the email generated after you have uploaded the dataset and want to inform the consultant and AESI that you have submitted your final EDD. You may upload your EDD as many times as you wish prior to sending this email, but it is this email that will serve as your time stamp. Honeywell will benchmark both your delivery time and the number of errors in your final EDD submission. This autonotify will contain the site and dataset # so a detailed error report can be accessed.

2 To recap. The lab will upload the completed EDD via the site specific database into the holding table which performs validation checks on the data. Applicable EIM interfaces have been captured and are provided infra. We expect the labs upload until there are no errors attributable to the labs – this may take many attempts on the part of the lab. Once successful, the lab stops and sends the Autonotify memo. This will serve as an active testimonial on the part of the lab that the EDD production is complete and all parties will have documentation of an error-free EDD. The error report (and all upload attempts) will be stored in EIM for review. An Autonotify memo sent regarding an EDD

still found to have errors will be returned to the lab (by the reviewing consultant). Since we are able to track this in EIM, repeated offenses by the same lab will warrant a corrective action plan be submitted to AESI by the laboratory. There is no penalty for the number of upload attempts by the lab prior to the Autonotify memo date. As discussed above, AESI, the Locus Help Desk and the consultants are here to advise and assist the lab in the EDD. Upon final delivery of the EDD, the consultant can download the EDD from the holding table in order to store an archival copy in their project files.

Remember that one of Honeywell's metrics for laboratory performance is the delay in the laboratory providing the error-free EDD. Laboratories must submit the EDD by the due date or incur penalties associated with the MSA then in effect. The laboratory is advised to retain error reports from EIM™ in the event there is a

discussion attributing errors in EDDs. The EIM™ data checker is accessible at the Locus web site and

USER NAME: LAB_NAME:

will now be associated with specific Honeywell sites. You will no longer be using a generic EDD checker;

PASSWORD:

the checker will now be site specific. To access the data checker and to upload to the site specific holding table, enter the confidential laboratory name and password indicated in the box above. Current laboratories have an individual password and user name. New laboratories will be provided a username and password by AESI. Please protect your passwords to help ensure the security of the EIM™ data checker program.

Because you will be uploading to a site-specific data base, there will no longer be the generic self-test as in the past. The EDD example above is provided as and example of the form, but will not upload successfully to any particular site.

B. EDD Self- Test Instructions

The EDD self-test instruction for Honeywell projects is described below and summarized in Figure 1. The self-test will be use actual site data. The numbering below corresponds to the numbers in Figure 1.

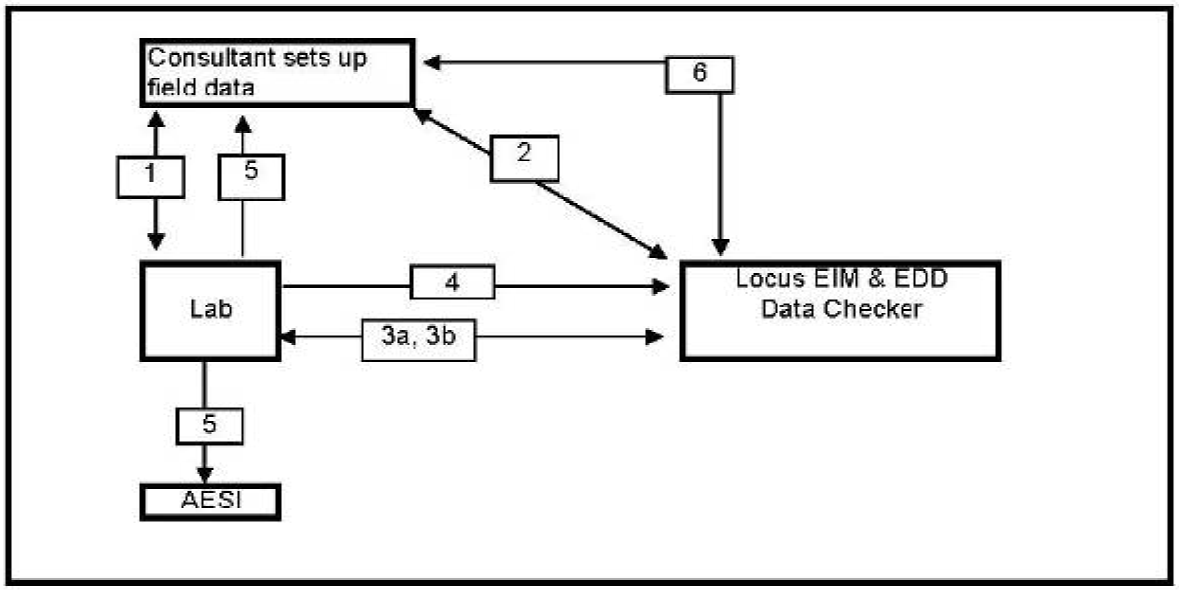


FIGURE 1
EDD Upload Process

1 The consultant communicates the project needs to the laboratory and establishes/confirms any use of valid values and instructs Locus (through the Locus Help Desk) to grant access to site specific data bases. Your laboratory EDD will be verified against site-specific databases. The lab obtains the list of valid values from the Locus web site. We suggest the lab check for valid values at least weekly.

2 The consultant sets up their portion of the EIM™ database. This includes site-specific data, field sample IDs and COC information.

3a. The laboratory submits an EDD to the site specific web-based data checker for evaluation.

3b. The laboratory obtains an error report and fixes their errors. At this point the laboratory may submit another amended EDD to the EIM™ data checker if desired and may do so as often as desired prior to submitting the final EDD and the autonotify email to the consultants and AESI. For EDD problems of a persistent nature, the EIM Help desk, the consultant and AESI are available to assist the labs.

1 The laboratory uploads the final error-free EDD to the site specific data base (access having previously been given by Locus). The laboratory's final EDD is now in the holding table.

2 The Lab submits the autonotify email and the error report to the consultant and to AESI

3 Consultant reviews the error report and accesses the actual error free EIM EDD. Periodic discussion between AESI, the consultant and Honeywell will address ongoing defects. The consultant submits the EDD to any further validation or review and places the EDD into the permanent EIM table.

This process should drastically reduce future EDD errors. Please note that Field #1 [FIELD_SAMPLE_ID] (as shown in Table 3) is the key link between laboratory-supplied information and consultant-supplied information (i.e., key database field) and must be unique.

It is the responsibility of the Honeywell consultant to generate this unique ID and provide that information to the laboratory when requesting analyses. Please refer to Table 3 for a complete list of required fields, who is responsible for them (C = consultant; L = lab) and if these fields must be established ahead of time (A) or can be submitted with the EDD submission (S).

Honeywell utilizes an electronic COC (E-COC) that makes many of the COC fields available to the lab in either a text file or an Excel file. To save significant time and avoid transcription errors, the lab is highly advised to request this text (or Excel) file from the consultant for upload to the lab LIMS during sample log-in. Table 2 contains a listing of the fields that are available from both the text or Excel file. The text or Excel file will be named using the COC number.

IV. CA Geotracker Requirements

As discussed throughout this memo, labs that must submit the CA Geotracker EDD and the Honeywell EIM EDD can now do so through one EDD: EIMEDF. Note that Fields #54 - #63 are unique to labs submitting packages to pursuant to this protocol. Also note that in Table 3, we list the field length for the Honeywell EIMEDF, but in addition, there are shaded texts that limit the number of characters when a Geotracker EDD is involved. For example 25 characters are allowed in EIMEDF, Field #1, but not in Geotracker. When submitting the single EDD for both Honeywell and Geotracker, this field must be limited to 12 characters. Similarly, field #11 must be limited to 12 characters and fields #18 and #31 must be limited to 10 characters.

CA Geotracker also has the requirement that batch QC be submitted – something EIM53 also requires. This can be particularly important for MS/MSD samples. If you use a non-client (NC in Field #60) sample for the MS/MSD, and are reporting Geotracker fields, you must report all related fields for this non-client sample in the Honeywell EDD. Fields that are particularly important are:

a) Field #1. When reporting non-client samples as the MS/MSD or replicate, this field need not contain the non-client field sample ID.

b) Field #7. The concentration in the unspiked sample used as the non-client or "batch" QC must be included.

c) Field #63. This field is described above in Table 3.

d) Field #60. This field will contain the valid value NC for a non-client sample used as "batch" QC.

V. Certification and Agreement

Laboratories must affirm, below, their ability to produce an ASCII file like the excerpt provided in this memo, upload a properly prepared file to the EIM™ data checker and access the EIM™ error report.

Honeywell requires is the laboratory to be certain they can produce an EDD to meet Honeywell EDD specifications outlined in this memo, be able to use the web-based EIM™ data checker, and obtain an error report from the data checker. Since this process is site specific, there is no “generic” EDD; you will be testing the process using live data. Therefore, you should begin as soon as possible, taking advantage of the time prior to April 30, 2006. A template file is provided (Example_64Field_EDD.txt) for you to examine, but it may not upload to a site specific database.

Adherence to Honeywell’s EDD requirements has been incorporated into the Honeywell Laboratory Services Agreement entered into between your laboratory and Honeywell. Honeywell and AESI will complete the review of laboratory affirmations and laboratory feedback/comments WITHIN 30 DAYS OF RECIEPT OF THIS MEMO. Laboratory comments and the affirmation should be sent to:

Rene Surgi AESI 503 Oakdale Avenue Glencoe, Illinois 60022 Telephone: 847-835-0983 Fax: 847-835-9404 e-mail renesurgi@aol.com

Affirmations must be signed and e-mailed as a PDF file. Comments may be submitted via email. Honeywell appreciates your efforts to help streamline and improve Honeywell’s environmental data management process.

Rene Surgi

Rene Surgi, Ph.D. AESI 503 Oakdale Ave. Glencoe, IL 60022 Attachments Appendix A1: LabID_Methods_ParameterCodes 02-24-06 1213.xls Appendix A2: EIM_Example_EDD64.txt (electronic attachment) Appendix A3: Screen Captures for Laboratory Uploads

Affirmation

I affirm that ___________________________________analytical laboratory

(Name of laboratory) can meet the requirements for the Honeywell EDD and EDD data submission requirements as outlined in the memo from Analytical and Environmental Services, Inc., dated March 1, 2006 _________________________________ (_______________) Signature of Laboratory Director (Date)

Name of Laboratory Director (Please Print)

TABLE 2
Order and Available Fields from E-COC as Text or as Excel Files

COC Field #	Field Description	Locus User	Lab EIM
1	FIELD_SAMPLE_ID	EIM	1
2	LOCATION_ID	EIM	
3	SITE_ID	EIM	
4	SAMPLE_DATE	EIM	
5	SAMPLE_TIME	EIM	
6	SAMPLE_PURPOSE	EIM	37
7	SAMPLE_TYPE	EIM	
8	SAMPLE_MATRIX	EIM	10
9	SAMPLE_START_DEPTH	EIM	
10	SAMPLE_END_DEPTH	EIM	
11	SAMPLE_DEPTH_UNITS	EIM	
12	SAMPLING_COMPANY	EIM	
13	SAMPLERS	EIM	
14	COC_NUMBER	EIM	
15	TEST_NAME	EIM	
16	LAB_JOB_NUMBER	LAB	
17	PRESERVATIVE	EIM	
18	LAB_PROJECT_NUMBER	LAB	
19	GRAB/COMPOSITE	EIM	
20	TAT-Agreed # Days	EIM	
21	FILTERED_FLAG	EIM	27
22	SITEINVESTIGATION_PHASE	EIM	
23	SAMPLING_PROGRAM	EIM	
24	LAB_ID	EIM	2

TABLE 3
Honeywell EDD Required fields (bold) and Other fields.
Geotracker California fields in shaded rows.

Field	Field Name	When (A = Ahead); S = with data)	Who (L = lab; C consul-tant)	Level	Length	Field Contents
1	**FIELD_SAMPLE_ID**	A	C	2	C25	Field Sample number or identifier. Can be left blank for lab-originated samples. This field is required of the consultant and must be on the COC. For labs producing the CA Geotracker EDD, this field is limited to 12 characters.
2	**LAB_ID**	A	L	2	C10	Code or identifier for a lab. Lab names are assigned as valid values by AESI and are rigorous (locked). Valid values can be found in Appendix A1 (electronic file).
3	**ANALYTICAL_METHOD**	A	L	2	C30	Analytical method used. Must conform to the list of valid values maintained by AESI. See Appendix A1 (electronic file) for valid values. Deviations or new analytical methods will be supervised by AESI.
4	**ANALYSIS_DATE**	S	L	2	Date	Date of analysis, MM/DD/YYYY or DD-MON-YY
5	**PARAMETER_CODE**	A	L	2	C12	Analyte CAS Number or the Assigned valid value (see Appendix A1 (electronic file)) for analyses having no CAS numbers (i.e., alkalinity, pH). These must conform to the list of valid values in Appendix A1. New codes can be added only if they are not in the current list. AESI will review lab submissions for non-conformance on a monthly basis and issue appropriate corrective actions.
6	**RESULT_TYPE_CODE**	A	L	2	C5	Code identifying the result. See Table 4. Lab tells consultant which fields it will be providing. Must conform to HONEYWELL list of valid values.
7	**LAB_RESULT**	S	L	2	C10	Analytical Result (see also Field #53 **BASIS**). If nondetect, ***below the MDL***, enter the laboratory reporting limit here. ***If detected above the MDL and below the reporting limit, enter the result – a "J" flag will also be used as stipulated in Field #13. Some facilities may specify reporting only to the reporting limit and not to the MDL. For these cases, enter the laboratory reporting limit and a "U" flag in Field #13 if the result is below the laboratory reporting limit.***
8	**LAB_UNITS**	A	L	2	C10	Unit of measure of the result. Must conform to the valid value list. See Table 4.

Field	Field Name	When (A = Ahead); S = with data)	Who (L = lab; C consul-tant)	Level	Length	Field Contents
9	**LAB_REPORTING_LIMIT**	S	L	2	C10	Actual Reporting Limit realized by the lab, adjusted for preparation, dilution, etc.
10	**LAB_MATRIX**	S	L	2	C10	Matrix of Sample. See Table 4. Must conform to the valid value list.
11	**LAB_SAMPLE_ID**	S	L	2	C20	Internal ID assigned by lab to track a sample within the lab. For labs producing the CA Geotracker EDD, this field is limited to 12 characters.
12	**ANALYSIS_TIME**	S	L	2	Time	Time of analysis (HH:MM), military time.
13	**LAB_QUALIFIER**	S	L	2	C10	Laboratory Qualifier. See Table 4.
14	RETENTION_TIME	S	L	2	Time	Retention time **required** for TICS only. For others enter NA or leave blank, MM:SS
15	**DILUTION_FACTOR***	S	L	2	C7	Dilution factor if the sample was diluted.
16	**PREP_METHOD**	S	L	2	C20	Preparation method (if applicable)
17	**PREP_DATE***	S	L	2	Date	Date of preparation MM/DD/YYYY (if applicable)
18	**ANALYSIS_LOT_ID**	S	L	2	C20	Laboratory analysis batch number or ID. For labs producing the CA Geotracker EDD, this field is limited to 10 characters.
19	**PREP_AMOUNT**	S	L	2	C10	Amount of sample used in the preparation.
20	**PREP_UNITS**	S	L	2	C10	Unit or measure of sample preparation amount. See Table 4. Must conform to the list of valid values.
21	**PREP_AMT_BASIS**	S	L	2	C5	The basis of the weight of the amount of the sample prepared: W or Dry are the only valid values (W = wet; D = dry).
22	**SAMPLE_DELIVERY_GROUP**	S	L	2	C20	Laboratory sample delivery group
23	**LAB_BLANK_SAMPLE_ID**	S	L	2	C20	ID of laboratory blank associated with the sample identified in the FIELD_SAMPLE_ID and/or LAB_SAMPLE_ID fields.

Field	Field Name	When (A = Ahead); S = with data)	Who (L = lab; C consul-tant)	Level	Length	Field Contents
24	ERROR	S	L	2	C10	+/- 2-sigma error (pertains to radiological results only)
25	**PARAMETER_NAME**	S	L	2	C60	Name of parameter. Any correct synonym is acceptable (i.e., Methylethyl ketone, 2-Butanone, etc.) However, Field #5 must have the correct CAS# or Honeywell assigned valid value.
26	**ANALYSIS_TYPE_CODE**	A	L	2	C5	Type of analysis. See Table 4.
27	**FILTERED_FLAG**	S	L	2	C1	Flag to identify whether sample was filtered or not. The only valid values are Y, N.
28	**LEACHED_FLAG**	S	L	2	C1	Flag to identify whether sample was leached prior to being analyzed. See Table 4. The only valid values are Y, N.
29	**LEACHATE_METHOD**	S	L	2	C20	Method used to leach a sample (if applicable)
30	LEACHATE_DATE	S	L	2	Date	Sample leachate date MM/DD/YYYY (if applicable)
31	LEACHATE_TIME	S	L	2	Time	Sample leachate time (if applicable) HH:MM, military time.
32	**SAMPLE_PREP_LOT_ID***	S	L	2	C20	Laboratory prep lot number or ID (if applicable), military time. For labs producing the CA Geotracker EDD, this field is limited to 10 characters.
33	LEACHATE_LOT_ID	S	L	2	C20	Laboratory leachate lot number or ID (if applicable)
34	**PREP_TIME**	S	L	2	Time	Time of preparation HH:MM (if applicable).
35	**METHOD_DETECTION_LIMIT**	S	L	2	C10	Method detection limit. This is the result of the annual MDL study.
36	*SAMPLE_DATE**	S	L	2	Date	Date Sample was created in the lab: MM/DD/YYYY, Should be left blank for field originated samples (see discussion below for SAMPLE_PURPOSE)

Field	Field Name	When (A = Ahead); S = with data)	Who (L = lab; C consul-tant)	Level	Length	Field Contents
37	*SAMPLE_PURPOSE**	A	C (if a field designa-tion) L (if a lab design-tion)	2	C5	The purpose of the sample. REG is the valid value for field-originated samples (i.e. regular, trip blank, field blank, field duplicate, and rinsate blanks). Should be populated for matrix spikes and duplicates, method blanks, blank spikes and duplicates, lab duplicates, and any other lab originated or transformed samples. See Table 4.
38	*ORIGINAL_LAB_RESULT*	S	L	2	C10	The concentration of the analyte in the original (unspiked) sample.
39	*SPIKE_ADDED*	S	L	2	C10	Amount of spike added to sample
40	*SPIKED_RESULT*	S	L	2	C10	Concentration of the analyte in the spiked sample
41	*SPIKE_RECOVERY**	S	L	2	C10	Percent recovery
42	*RPD**	S	L	2	C10	Calculation of relative percent difference (for duplicates only)
43	*RPD_LIMIT**	S	L	2	C10	Upper limit for RPD (percent) (for duplicates only)
44	*UPPER_LIMIT**	S	L	2	C10	Upper control limit (percent) for spike recovery (for spikes and spike duplicates, surrogates, laboratory control samples, and any spiked samples only)
45	*LOWER_LIMIT**	S	L	2	C10	Lower control limit (percent) for spike recovery (for spikes and spike duplicates, surrogates, laboratory control samples, and any spiked samples only)
46	*LAB_ARRIVAL_DATE*	S	L	2	Date	Enter the date the sample arrived at the lab (mm/dd/yyyy)
47	*LAB_ARRIVAL_TIME*	S	L	2	Time	Enter the time the sample arrived at the lab (HH:MM). This is used to compute TAT compliance.
48	*REP_DATE*	S	L	2	Date	Date of Hardcopy lab report. The time stamp in Locus EIM will be used to record the date and time EDD delivered. Use the shortest time requested (i.e., level 2 in 5 days and full report in 12 days; use 5 days in this field).
49	*RUSH_TAT*	S	L	2	C1	Sample was submitted as "Rush" – valid values for this field are Y, N.

Field	Field Name	When (A = Ahead); S = with data)	Who (L = lab; C consul-tant)	Level	Length	Field Contents
50	*DUE_DATE*	S	L	2	Date	Enter earliest date (mm/dd/yyyy) a deliverable is due. For example a 2-day TAT requires the level 2 hardcopy be delivered in 48 hours and the EIM EDD be delivered in 10 days. In this case enter the 2-day TAT.
51	*SUBCONTRACT**	S	L	2	C1	Y= yes, analysis subcontracted; field can be left blank if sample not subcontracted.
52	*SUBCONTRACT_LAB_ID**	S	L	2	C10	Code or identifier for a subcontract lab. Subcontract lab names are assigned as valid values (Appendix A1) (electronic file).
53	*BASIS*	S	L	2	C3	Basis for reporting the result. See Table 4.
54	APPRVD:	S	L	CA-All	C3	Initials of individual approving lab report. This field is not required.
55	**CLCODE**	S	L	CA-All	C4	Quality control limit type. See Table 4.
56	**CLREVDATE**	S	L	CA-All	Date	Date a control limit established.
57	**LABWO**	S	L	CA-All	C10	Lab work order number. Use the Lab SDG to confine the data management to 20 samples + associated QC. This helps limit the QCCODE appendix to "1" – i.e., BS1, CD1, CS1, etc. and makes mapping the EIM EDD (controlled by SDG #) to Geotracker EDF easier because it limits the size of the laboratory Work Order to the size of the SDG.
58	**MODPARLIST**	S	L	CA-All	C1	A field indicating whether the parameter list of an analytical method has been modified – valid values for this field are Y, N.
59	**PVCCODE**	S	L	CA-All	C2	A code identifying whether a sample result is a primary or a confirmatory value. The most commonly used values are **"PR"** and **"SR"**. See Table 4.
60	**QCCODE**	S	L	CA-All	C3	Code identifying the type of sample (e.g., laboratory-generated, environmental, etc.). See Table 4.

Field	Field Name	When (A = Ahead); S = with data)	Who (L = lab; C consul-tant)	Level	Length	Field Contents
61	**REPDLVQ**	S	L	CA-All	C3	Code identifying type of reporting limit. See Table 4. Most common values are "**PQL**" and "**NA**".
62	**RUN_NUMBER**	S	L	CA-All	C20	Numeric laboratory run number code distinguishing multiple or repeat analysis of a sample by the same method on the same day.
63	**LAB_REF_ID**	S	L	CA-All	C12	The laboratory reference sample ID is the laboratory assigned sample ID of the sample ID upon which the QC sample is referenced in order to calculate the QC result. This field may not be left blank when QCCODE = MS, MSD or LR and MUST be left blank in all other cases. Enter the LAB_SAMPLE_ID (EIM Field #11) of the client sample that was spiked or replicated in this field. This field is applicable when batch QC is being reported. For example if client A has its own MS and MSD (i.e., A, A-MS and A-MSD) these would be entered in field #11 of client A's EIM EDD. For this MS/MSD to be used for Honeywell samples, this field (#63) would contain A for the MS and A for the MSD because A is the ID of the sample upon which the QC is based.
64	**SRM**	S	L	CA-All	C10	Code identifying the standard reference material used in the analysis. Usually this is entered manually for most laboratories. See Table 4.

a. Fields in Bold Regular font are required (e.g., LAB_ID). Some fields have an asterisk following them (e.g., DILUTION_FACTOR and SAMPLE_PREP_LOT_ID). This signifies that the field can be left blank if it is not applicable. In the case of Sample Prep Lot ID in particular, a value needs to be provided for this field only if it is different than the ANALYSIS_LOT_ID.

b. Fields in Regular font are optional

c. Fields In Bold Italics fonts are required for laboratory QC samples (e.g., SAMPLE_PURPOSE). Several of these fields have an asterisk following them. This indicates the field is required only if it is applicable. For example, RPD and RPD_LIMIT can be left blank for all but laboratory control, blank spike, and matrix spike duplicates.

d. If you use a non-client (NC in Field #60) sample for the MS/MSD, and are reporting Geotracker fields, you must report the all related fields for this non-client sample in the Honeywell EIM EDD. For example, the concentration in the unspiked sample must be reported, but the Field_Sample_ID is not necessary. If you laboratory LIMS is unable to associate a non-client QC sample with a Honeywell sample(s), you must run a Honeywell specific QC sample (i.e. MS, MSD) at no charge to Honeywell.

TABLE 4
List of Valid Values Referred to in Table 3.

Field (# out of EIM in parentheses)	Valid Values	Values Description
ANALYSIS_TYPE_CODE (26)	INIT	Initial analysis.
	REANL	Reanalysis (without reextraction).
	REAN2	Second reanalysis (without reextraction)
	REAN3	Third reanalysis (without reextraction)
	REEXT	Reextraction (presumes reanalysis).
	REEX2	Second reextraction (presumes reanalysis)
	REEX3	Third reextraction (presumes reanalysis)
	DIL	Dilution
	CONF	Confirmatory analyses
	DIL2	Second dilution
FILTERED_FLAG (27)	Y	Yes, the sample was filtered.
	N	No, the sample was not filtered.
LAB_UNITS (8)	ug/L	micrograms/liter
	mg/L	milligram/liter
	ug/kg	micrograms/kilogram
	mg/kg	milligrams/kilogram
	Wt %	Weight percent
	Eq	Equivalents
	Meq	Milliequivalents
	g	grams
	mg	milligrams
	L	Liter
	ml	Milliliters

Field (# out of EIM in parentheses)	Valid Values	Values Description
	s.u.	standard units
	deg C	Degrees C
	deg F	Degrees F
	g/ml	grams/milliliter
	mV	Millivolts
	Ratio	Unitless ratio (numerator and denominator posses the same units
	umoles/g	micromoles/gram
	ppmV	Parts per million – volume (air measurements)
	ppbV	Parts per billion – volume (air measurements)
	mg/m^3	milligrams/cubic meter (air measurements)
	ug/m^3	micrograms/cubic meter (air measurements)
	mg/m^2	milligrams/square meter (wipes or area measurements)
	ug/m^2	micrograms/square meter (wipes of area measurements)
	ntu	Turbidity units
	%	Percent recovery
	megohm/cm	Mega ohms per centimeter
	meq/kg	Milliequivalents per kg
	MFL	Million fibers per liter (asbestos)
	MHOS	Mhos – units of conductivity
	mm/sec	Millimeters per second; units of ignitability
	pCi/g	Picocuries per gram
	pCi/L	Picocuries per liter
	Pos/Neg	Positive/negative result (Positive = 1; Negative = 0 in Field #7.
	ug/Wipe	Micrograms per wipe

Field (# out of EIM in parentheses)	Valid Values	Values Description
	Yes/No	Yes/No results (Yes = 1; No = 0 in Field #7)
LAB_MATRIX	AIR	Air sample.
(10)	LIQUID	Any liquid phase not adequately described by other valid values.
	SOLID	Any solid phase not adequately described by other valid values.
	WASTE	Waste sample: covers remaining non-aqueous samples.
	SOIL	Soil sample.
	WATER	Water sample.
	DNAPL	Dense non-aqueous phase liquid.
	LNAPL	Light non-aqueous phase liquid.
	BIOTA	Biological samples.
	GAS	Gas
	LEACHATE	Leachate
	SLUDGE	Sludge
	VAPOR	Vapor
	WIPE	Wipe
LAB_QUALIFIER	B	Analyte was detected in the associated method blank.
(13)	N	There is presumptive evidence that the compound is present, but it has not been confirmed. The analyte is tentatively identified. All quality control criteria necessary for identification were not met.
	E	Concentration exceeds the calibration range and therefore result is semi-quantitative.
	DIL	Dilution and reporting limit raised.
	H	Sample analysis performed past method-specified holding time.

Field (# out of EIM in parentheses)	Valid Values	Values Description
	J	Estimated value. Analyte detected at a level less than the Reporting Limit (RL) and greater than or equal to the Method Detection Limit (MDL). The user of this data should be aware that this data is of unknown quality.
	UJ	Analyte is undetected. Estimated value. Analyte detected at a level less than the Reporting Limit (RL) and greater than or equal to the Method Detection Limit (MDL). The user of this data should be aware that this data is of unknown quality.
	BJ	Estimated value. Blank contamination.
	NJ	There is presumptive evidence that the compound is present, but it has not been confirmed. The analyte is tentatively identified. All quality control criteria necessary for identification were not met. Estimated value. Analyte detected at a level less than the Reporting Limit (RL) and greater than or equal to the Method Detection Limit (MDL). The user of this data should be aware that this data is of unknown quality.
	MS-NR	There was no MS/MSD analyzed with this batch due to insufficient sample volume (NR = not reported). See Blank Spike/Blank Spike Duplicate.
	DIL-MX	The sample required a dilution due to matrix interference. Because of this dilution, the matrix spike concentrations in the sample were reduced to a level where the recovery calculation does not provide useful information. See Blank Spike (LCS).
	MS-FR	Matrix Spike recovery was outside the method control limits (FR = recovery failure).
	LCS-FR	LCS failed recovery.
	S	Analyzed by standard addition.
	U	Analyte is undetected
	SURR-FR	Surrogate recovery outside method criteria or lab statistical criteria (FR = recovery failure).
	LR-RPD	Duplicate analysis precision not within control limits. This valid value should be used for all RPD limits (including QC such as MS/MSD; LCS/LCSD; sample/sample duplicate)
	P	GC/HPLC target analytes where there is a greater than 40% difference for detected concentration between the primary and confirmation results.

Field (# out of EIM in parentheses)	Valid Values	Values Description
	BD	Radiological: Target parameter below the minimum detectable concentration or for low tracer recovery.
	UI	Radiological: Flag indicates uncertainty for gamma spectroscopy.
	I	Dioxin: This flag is used to indicate labeled standards have been interfered with on the GC column by co-eluting, interfering peaks. The interference may have caused the standard’s area to be overestimated. All quantitation relative to this standard, therefore, may be underestimated.
	K	Dioxin: EMPC. Ion abundance ratios associated with a particular compound are outside QC limits. This is the estimated maximum possible concentration for the associated compound.
	PR	Dioxin: A GC peak is poorly resolved. The concentrations reported for such peaks are most likely overestimated
	Q	Dioxin: Indicates the presence of QC ion instabilities caused by quantitative interferences
	RO	Dioxin: This qualifier is used to indicate a labeled standard has an ion abundance ratio that is outside of the acceptable QC limits, most likely due to a co-eluting interference. This may have caused the percent recovery of the standard to be over-estimated, therefore, all quantitation associated with this standard may be underestimated.
	V	Dioxin: A ‘V’ flag is used to indicate that, although the percent recovery of a labeled standard may be below a specific QC limit, the signal to noise ratio of the peak is greater than ten-to-one. The standard is reliably quantifiable, and all quantitations derived from the standard are considered valid as well.
	X	Dioxin: This flag is used to indicate that a polychlorodibenzofuran (PCDF) peak has eluted at the same time as the associated diphenyl ether (DPE) and that the DPE peak intensity is at least ten percent of the total PCDF peak intensity. Total PCDF values are flagged ‘X’ if the total DPE contribution to the total PCDF value is greater than ten percent. All PCDF peaks that are significantly influenced by the presence of DPE peaks are either reported as “estimated maximum possible concentration (EMPC) values without regard to the isotopic abundance ratio, or are included in the detection limit value depending upon the analytical method.
LEACHED_FLAG	Y	Yes, the sample was leached prior to being analyzed.

Field (# out of EIM in parentheses)	Valid Values	Values Description
(28)	N	No, the sample was not leached prior to being analyzed.
RESULT_TYPE_CODE (6)	IS	Internal Standard.
	SPK	Spiked compounds.
	SUR	Surrogate.
	TIC	Tentatively Identified Compound.
	TRG	Target Analyte.
SAMPLE_PURPOSE (37)	BS	Blank Spike.
	BSD	Blank Spike Duplicate.
	LCS	Laboratory Control Spike.
	LCSD	Laboratory Control Spike Duplicate.
	MB	Method Blank.
	MS	Matrix Spike.
	MSD	Matrix Spike Duplicate.
	LR	Lab Replicate..
	QCS	Quality Control Sample.
	AS	Analytical Spike
	REG	Regular sample
	AB	Ambient blank
	DUP	Duplicate
	EB	Equipment blank
	FD	Field duplicate
	TB	Trip Blank
	MSI	Matrix spike insoluble spike (i.e., Cr(VI) analyses)

Field (# out of EIM in parentheses)	Valid Values	Values Description
	LCSI	Laboratory control sample insoluble spike (i.e., Cr(VI) analyses).
	MSDI	Matrix spike duplicate insoluble spike (i.e., Cr(VI) analyses).
	LCSDI	Laboratory control sample duplicate insoluble spike (i.e., Cr(VI) analyses).
	FB	Field blank
SRM (64)	ABSSTD	Absolute Standards
	ACCUSTD	AccuStandard
	ALDRICH	Aldrich Chemical Co.
	ALPHAAESAR	Alpha Aesar
	APG	Analytical Products Group
	BURJAC	Burdick & Jackson
	CPI	CPI, Santa Rosa, CA
	CAMBRIDGE	Cambridge Isotope Labs
	CHEMSERV	Chem Services, Inc.
	EMSCIENCE	EM Science
	ERM	ERM, Inc.
	KODAK	Eastman Kodak Co.
	ENVEXPR	Environmental Express
	EMSL	Environmental Monitoring Systems Laboratory (EMSL), Las Vegas, NV
	ERAS	Environmental Research Associated Standards
	ETHYLCORP	Ethyl Corp.
	FISHER	Fisher Scientific
	HCRINEER	H.C. Rineer & Sons, Inc.
	HACH	HACH Chemical

Field (# out of EIM in parentheses)	Valid Values	Values Description
	HPS	High-Purity Standards
	INVENT	Inorganic Ventures
	JTBAKER	J. T. Baker
	LEEMAN	Leeman Laboratories
	MALLINBKRO	Mallinbkrodt
	MAZOLA	Mazola (R) Corn Oil
	NA	Not Applicable
	OIA	OI Analytical
	PLASMA	Plasma Chem, Inc.
	PROTOCOL	Protocol
	RADIAN	Radian Corporation
	RESTEK	Restek
	SPEX	SPEX Industries
	SGAS	Scotty Specialty Gases
	SIGMA	Sigma Chemical Co.
	SOLPUS	Solutions Plus
	SPECTRA	Spectra
	SUPELCO	Supelco
	SOURCE	The Source
	USATHAMA	U.S. Army
	NIST	U.S.D.C., National Institute of Standards & Technology
	ULTRA	Ultra Scientific
	VHGLABS	VHG Labs, Inc.
CLCODE (55)	SBSA	Both Reagent and Matrix Sample Accuracy for Surrogates

Field (# out of EIM in parentheses)	Valid Values	Values Description
	SBSP	Both Reagent and Matrix Sample Precision for Surrogates
	CLPCC	CLP Continuing Calibration Acceptance Criteria
	CLPIC	CLP Initial Calibration Acceptance Criteria
	CLPA	Contract Laboratory Program Accuracy Limits for Spiked Samples
	SCLA	Contract Laboratory Program Limits for Surrogate Accuracy
	SCLP	Contract Laboratory Program Limits for Surrogate Precision
	CLPP	Contract Laboratory Program Precision Limits for Spiked Samples
	CLPLR	Contract Laboratory Program Precision for Lab Replicates
	DU	Data Unavailable
	LCC	Laboratory Continuing Calibration Accuracy
	LLR	Laboratory Established Precision for Lab Replicates
	LIC	Laboratory Initial Calibration Accuracy
	LSA	Laboratory Sample Accuracy for Spiked Samples
	SLSA	Laboratory Sample Limits for Accuracy for Surrogates
	SLSP	Laboratory Sample Limits for Precision for Surrogates
	LSP	Laboratory Sample Precision for Spiked Samples
	MLR	Matrix Laboratory Replicate Precision
	MSA	Matrix Spike Accuracy for Spiked Samples
	MSP	Matrix Spike Precision for Spiked Samples
	MEA	Method Established Accuracy for Spiked Samples
	MECC	Method Established Continuing Calibration Acceptance Criteria
	MEIC	Method Established Initial Calibration Acceptance Criteria
	SMEA	Method Established Limits for Accuracy for Surrogates

Field (# out of EIM in parentheses)	Valid Values	Values Description
	SMEP	Method Established Limits for Precision for Surrogates
	MELR	Method Established Precision for Laboratory Replicates
	MEP	Method Established Precision for Spiked Samples
	SMSA	Sample Matrix Limits for Accuracy for Surrogates
	SMSP	Sample Matrix Limits for Precision for Surrogates
	SRAD	Standard Reference Accuracy Defined by Agency/Manufacturer
	SRMA	Standard Reference Material Accuracy Limits Determined by Lab
	SRMP	Standard Reference Material Precision Limits Determined by Lab
	SRPD	Standard Reference Precision Defined by Agency/Manufacturer
PVCODE (59)	DU	Data Unavailable
	1C	First Column Result - The Value Obtained from the First Column
	MS	GC/MS Result - Value Confirmed Using GC/MS
	NR	Not Reported - Data Not Reported
	NU	Not Usable - Data Not Usable
	PR	Primary Result - The Primary Result for a Parameter
	2C	Second Column Result - The Value Obtained from the Second Column
	SR	Semi-Quantitative Result
QCCODE (60)7	BS1	Blank Spike (#1). If EIM Field #37 = BS; then QCCODE = BS1.
	BD1	Blank Spike Duplicate (#1). If Field #37 = BSD; then QCCODE = BD1.
	CS1	Client Sample. If Field #37 = REG; then QCCODE = CS1.

Field (# out of EIM in parentheses)	Valid Values	Values Description
	LB1	Laboratory Blank. If Field #37 = MB; then QCCODE = LB1.
	LR1	Lab Replicate. If Field #37 = LR; then QCCODE = LR1.
	MS1	Matrix Spike. If Field #37 = MS; then QCCDOE = MS1.
	NC	Non-Client Sample. If the results of the Matrix Spike are reported from a sample which is not a Honeywell sample (batch QC), the unspiked result of the other client's sample must be reported with the spiked sample (which is part of the Honeywell batch by virtue of its being used as a QC sample). The unspiked result carries the "NC" flag. If only Honeywell samples are used in a batch and the spike is performed on a Honeywell sample, this flag is not used. Labs reporting this flag incorrectly create significant errors. .
	SD1	Lab Matrix Spike Duplicate. If Field #37 = MSD; then QCCODE = SD1.
REPDLVQ (61)	CDL	Contract Required Detection Limit
	DU	Data Unavailable
	EQL	Estimated Quantitation Limit
	IDL	Instrument Detection Limit
	LOQ	Limit of Quantitation
	LLD	Lowest Level of Detection
	DDL	Method Defined Detection Limit
	MDL	Method Detection Limit
	MRL	Method Reporting Limit (lowest standard adjusted for prep.)
	NA	Not Applicable
	PRL	Parameter Range Limit
	PQL	Practical Quantitation Limit
	TDL	Target Method Detection Limit
BASIS (53)	W	Wet weight basis (soil samples)
	D	Dry weight basis (soil samples)

Field (# out of EIM in parentheses)	Valid Values	Values Description
	F	Field filtered (liquids)
	L	Lab filtered (liquids); exclusive of ordinary procedural requirements such as filtration of metal digestates)
	N	Not filtered (liquids)
	G	Centrifuge supernatant (liquids)
	U	Data unavailable
	A	Air

1 The actual valid values used must match those listed.

2 For any spiked compound, the lab must report the percent values for the SPIKE_RECOVERY, UPPER_LIMIT, and LOWER_LIMIT fields.

3 For Matrix Spike/Matrix Spike Duplicates or Lab Replicates, the lab should include, as applicable, the ID of the original field sample in the FIELD_SAMPLE_ID column with MS, MSD or LR appended.

4 A given LAB_SAMPLE_ID must have a unique purpose. As such, reporting the same ID for the original sample, and the Matrix Spike, Matrix Spike Duplicate, and/or Lab Replicate of this sample is not acceptable. If necessary, append the sample purpose code to these IDs (original sample excluded) to make them unique.

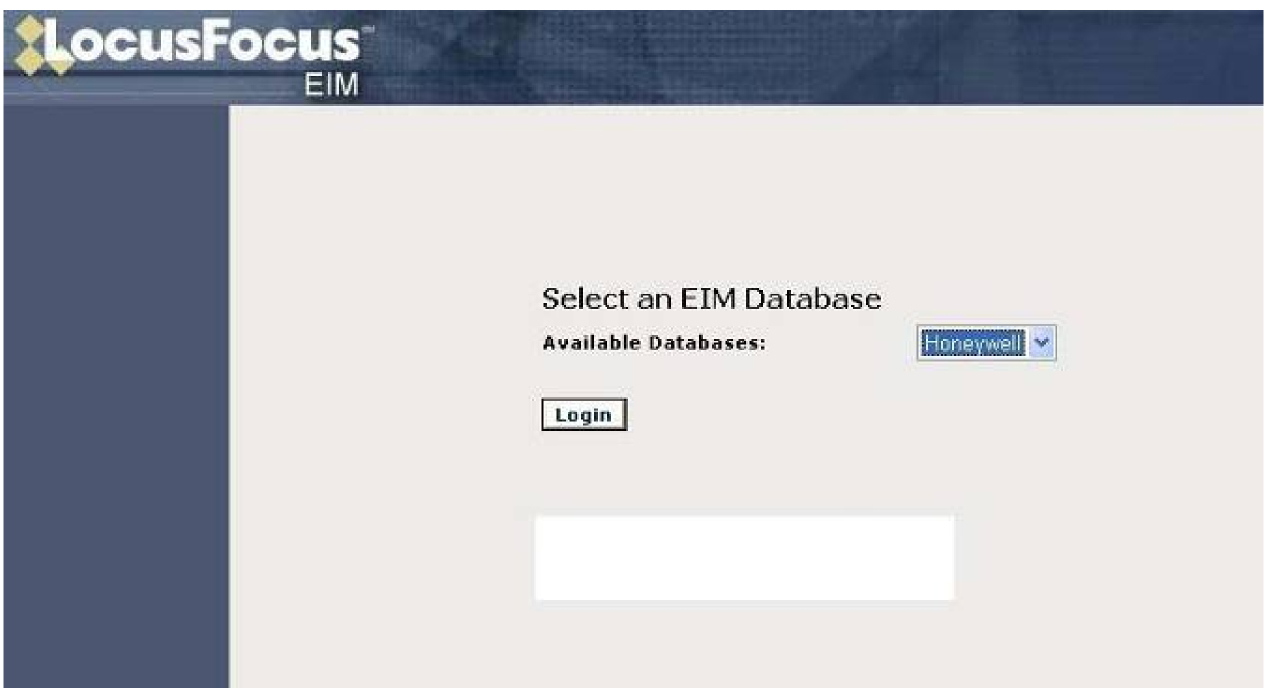
5 The sample date of a lab-originated sample is the date it came into existence in the lab, not the date the sample was collected in the field. Many labs use the prep date for this field. A given lab sample should not have multiple sample dates.

6 Valid Values must conform to the list of Honeywell Valid Values. Valid Values are maintained by the Honeywell Laboratory Program Manager and available on the Locus EIM Web Site.

7 Geotracker EDF provides for a substantial number of entries in these categories (i.e., BS1, BS2, BS3 …BSW.. for the Blank Spike). Geotracker format allows for submission of EDD results by Laboratory Work Order. There can be numerous batches (20 samples + MS + MSD + MB + LCS in a laboratory Work Order Number. If the laboratory Work Order consists of only one SDG, then the QCCODE need only use BS1. EIM provides the SDG and the laboratory Work Order Number

8 Shaded items are those indicated by the labs as being used most frequently.

Figure 1. EIM login.



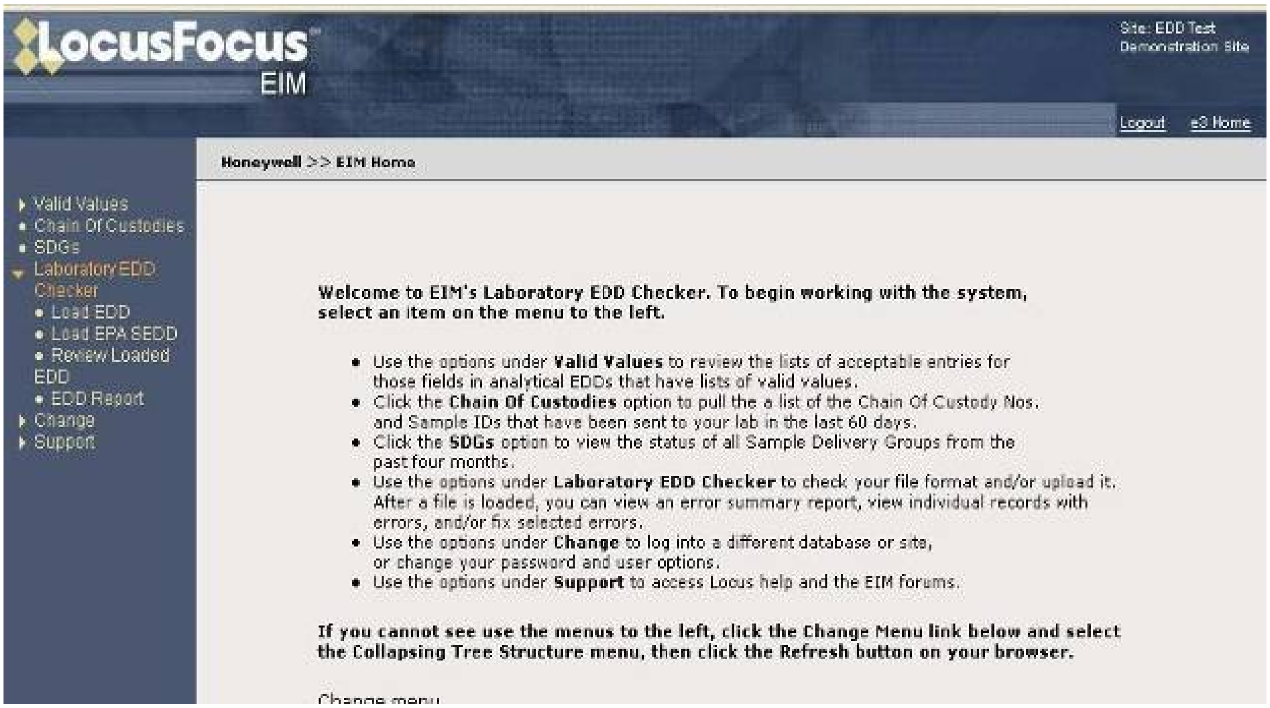


Figure 3. Laboratory upload window.

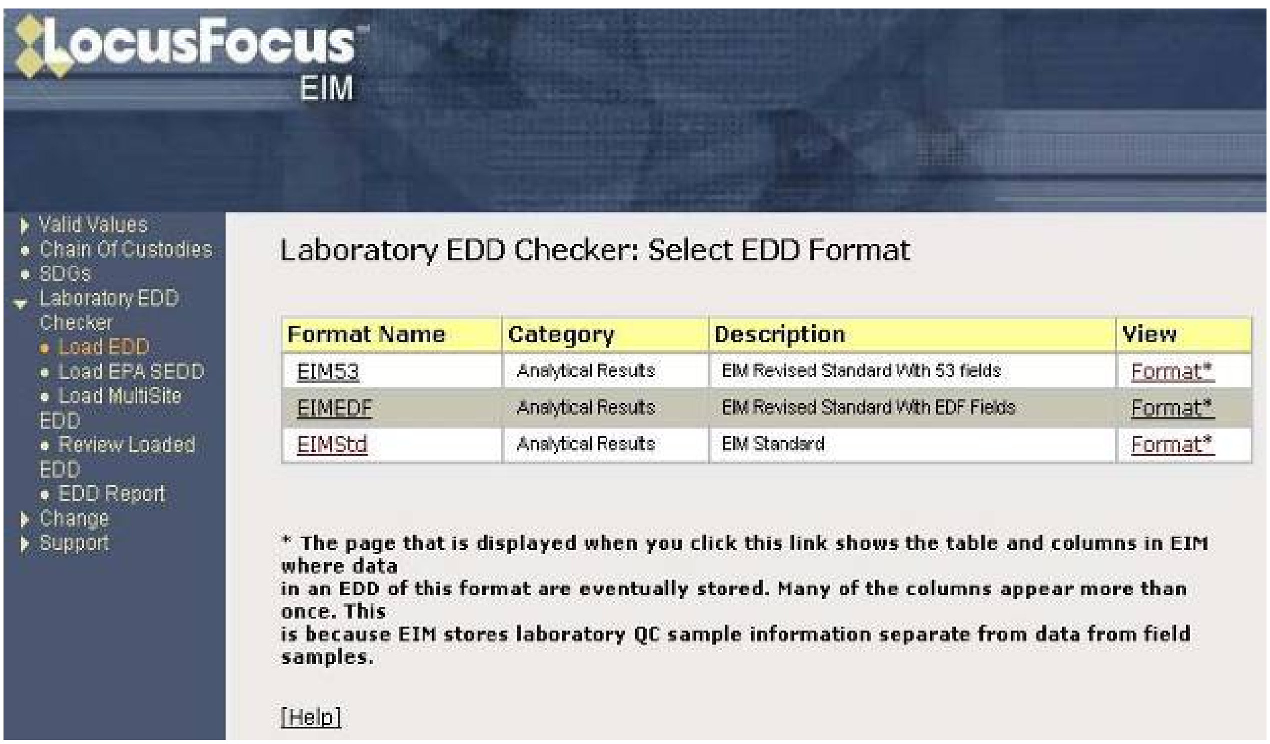


Figure 4. EIM Formats (EIMStd will be phased out and replaced by EIM53). EIMEDF is the single EDD that satisfies your Honeywell EDD and CA EDF EDD requirement with one EDD.

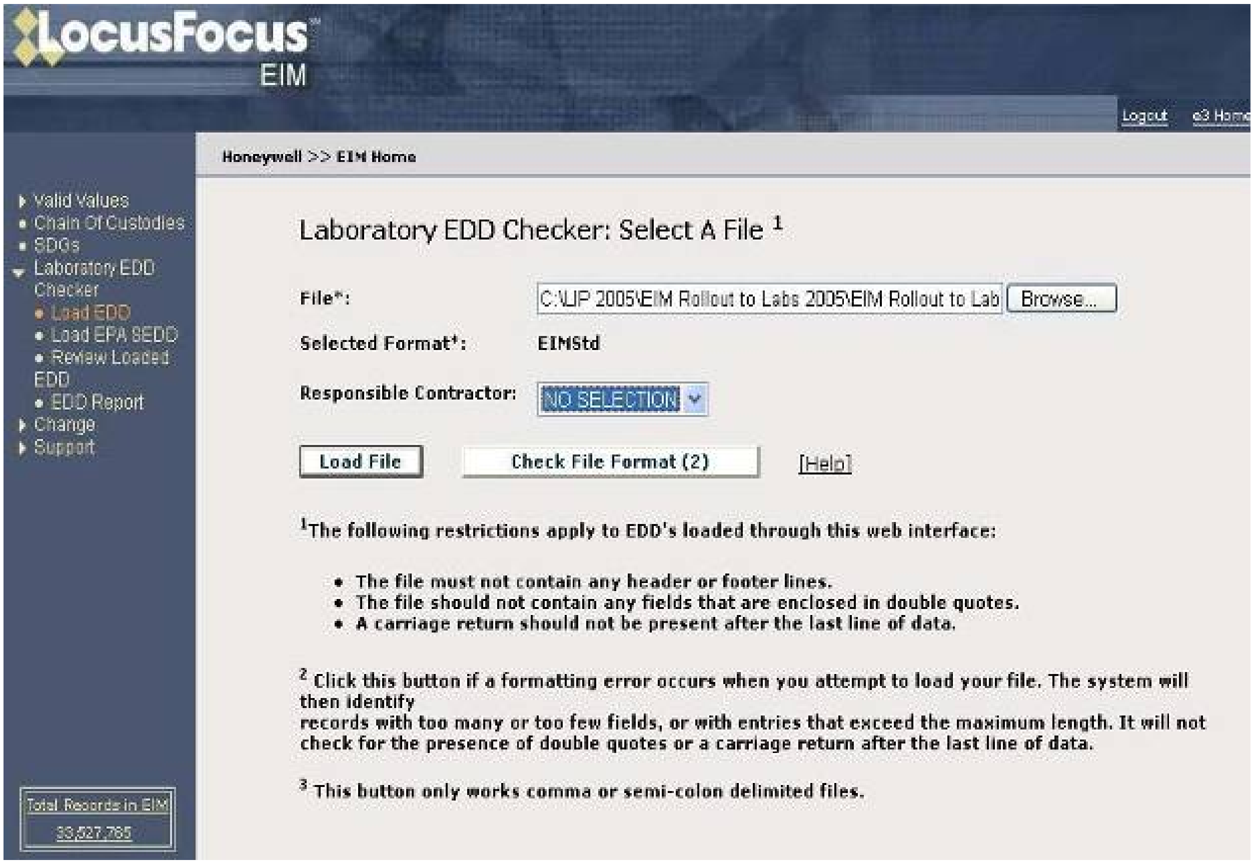


Figure 5. File Selection for laboratory upload to EIM.

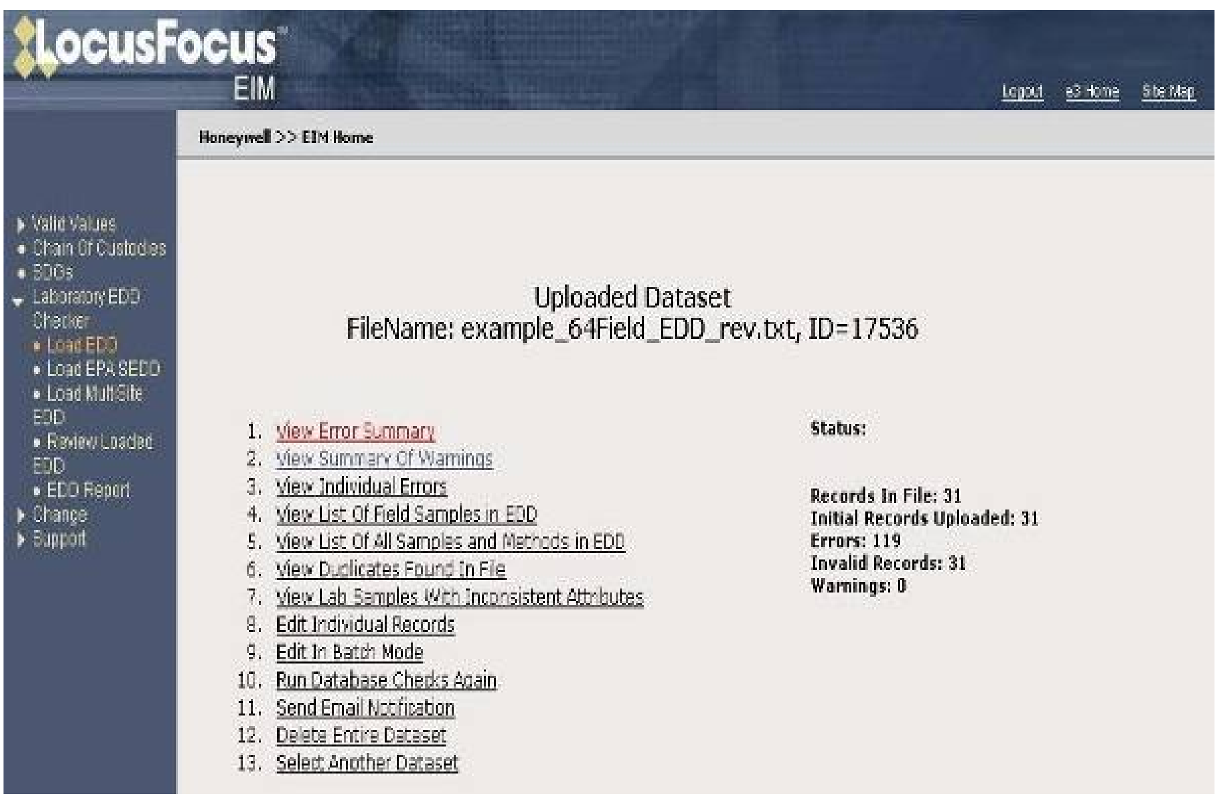
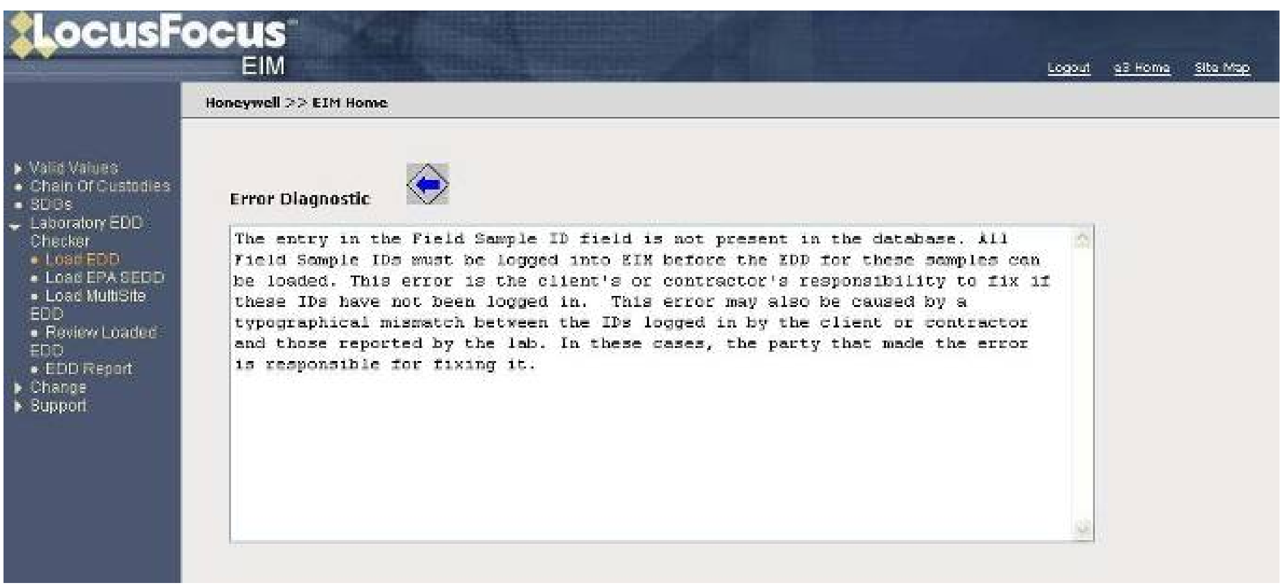


Figure 7. EIM Error Report. This is the report that the lab should view during its uploads prior to sending the autonotification that the EDD delivery is complete. The lab should resolve all error messages prior to submitting an autonotification; which may involve calling the consultant to clarify the basis of the errors listed. This sheet will be the one reviewed by AESI and the consultant. The autonotification date will be the time stamp for the purposed of computing on-time delivery and the errors reported here will form the basis of corrective action. This scenario shows where errors may listed, but be no fault of the laboratory. Appropriate corrective action will be taken against consultants who have not appropriately uploaded their portion of the EDD.



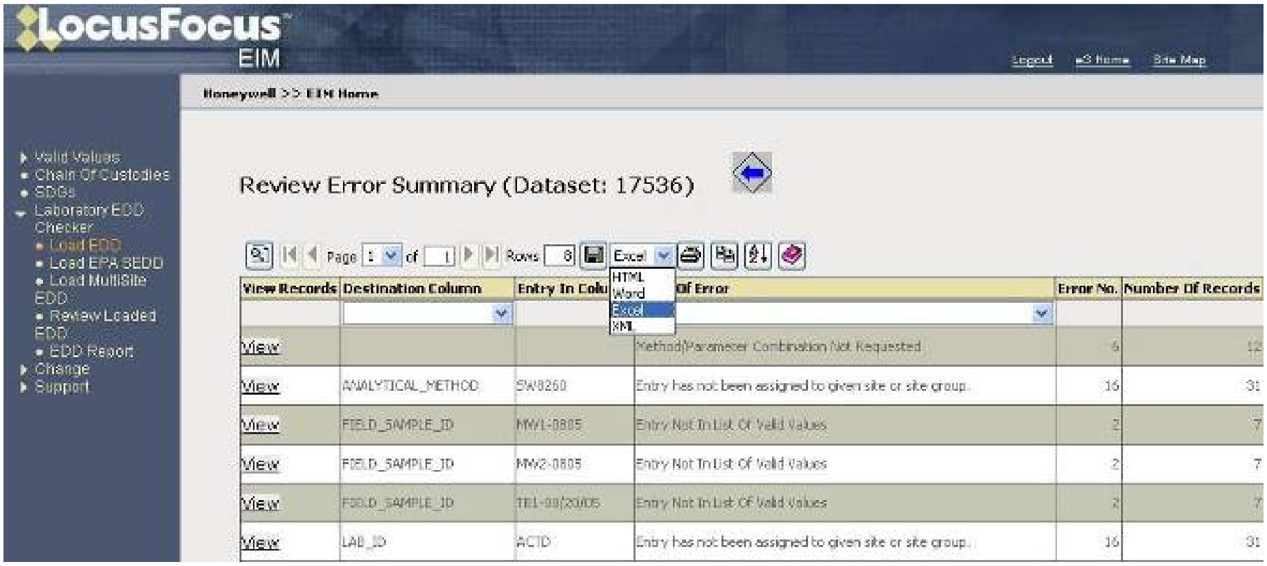
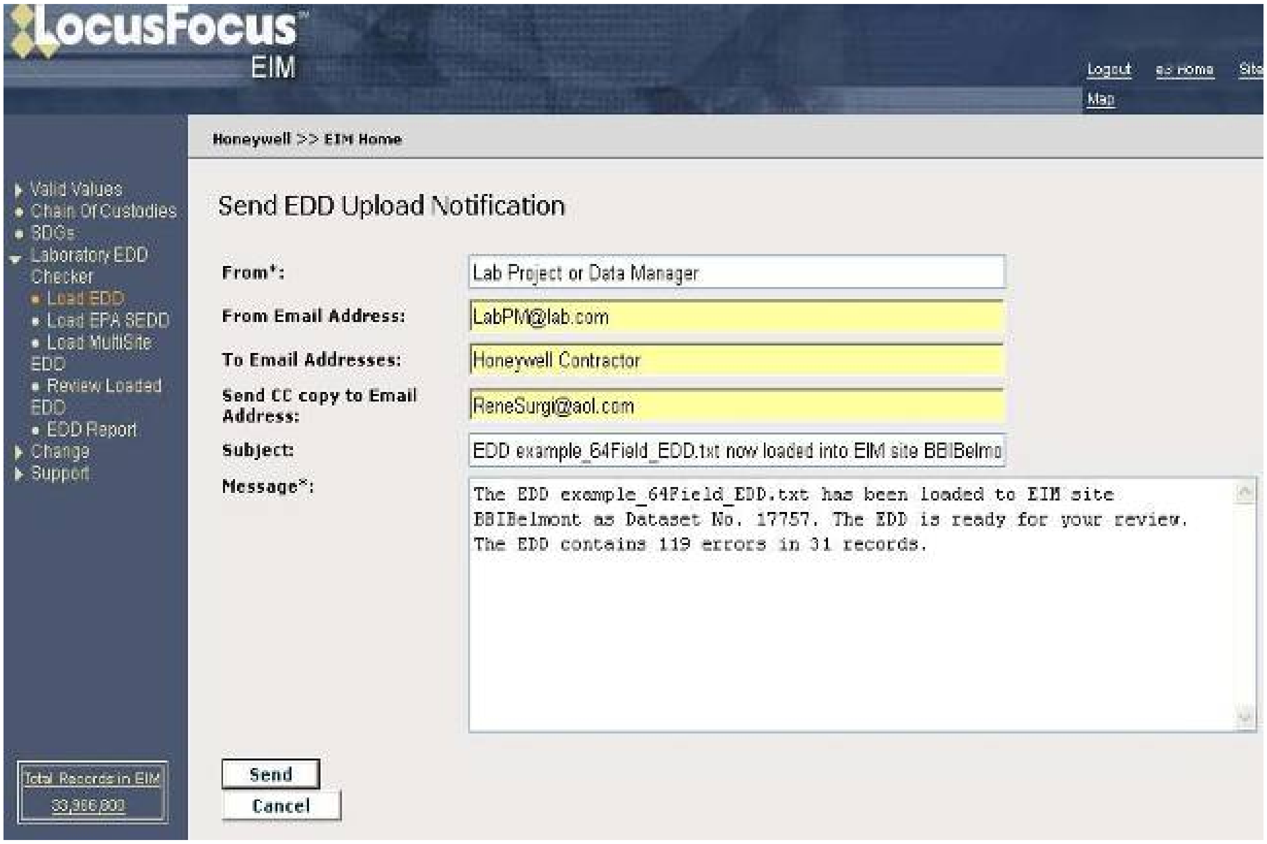


Figure 9. The error report can be output to an Excel version. The lab is advised to retain such an output in the event a discrepancy should arise in the nature of the errors.

	A	B	C	D	E	F	G	H
1	View Records	Destination Column	Entry In Column	Type Of Error	Error No.	Number Of Records	Responsible Party	Error Details
2	View			Method/Parameter Combination Not Requested	6	12	Lab/Consultant	17536
3	View	ANALYTICAL_METHOD	SW8260	Entry has not been assigned to given site or site group.	16	31	Consultant	17536
4	View	FIELD_SAMPLE_ID	MW1-0805	Entry Not In List Of Valid Values	2	7	Lab/Consultant	17536
5	View	FIELD_SAMPLE_ID	MW2-0805	Entry Not In List Of Valid Values	2	7	Lab/Consultant	17536
6	View	FIELD_SAMPLE_ID	TB1-08/20/05	Entry Not In List Of Valid Values	2	7	Lab/Consultant	17536
7	View	LAB_ID	ACTD	Entry has not been assigned to given site or site group.	16	31	Consultant	17536
8	View	REPORT_RESULT		Required Value Calculated Or Derived From Database Is Missing	14	12	Consultant	17536
9	View	REPORT_UNITS		Required Value Calculated Or Derived From Database Is Missing	14	12	Consultant	17536
10								
11								


LocusFocus
EIM
Logout
Home
Site Map
Honeywell >> EIM Home
Valid Values
Chain Of Custodies
SDGs
Laboratory EDD Checker
Load EDD
Load EPA SEDD
Load MultiSite EDD
Review Loaded EDD
EDD Report
Change
Support
Total Records in EIM
Send EDD Upload Notification
From*:
Lab Project or Data Manager
From Email Address:
LabPM@lab.com
To Email Addresses:
Honeywell Contractor
Send CC copy to Email Address:
ReneSurgi@aol.com
Subject:
EDD example_64Field_EDD.txt now loaded into EIM site BBIBelmo
Message*:
The EDD example_64Field_EDD.txt has been loaded to EIM site BBIBelmont as Dataset No. 17757. The EDD is ready for your review. The EDD contains 119 errors in 31 records.
Send
Cancel